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ABSTRACT

This packet contains an instructor guide and student reference for a course in introduction to beef production. The curriculum contains the following seven lessons: (1) introduction to the beef industry; (2) breeds of beef cattle; (3) principles of beef cattle selection; (4) production systems; (5) herd health; (6) herd management; and (7) industry issues. The instructor guide includes the following: objectives, competencies, motivational techniques, teaching procedures, other activities, activity sheets, transparency masters, evaluations, answers to evaluations and activity sheets, references and teaching aids, and materials and equipment lists. For ease of use, the guide includes competencies and objectives at the beginning of the guide as well as incorporated within each lesson. A competency profile is provided in the front of the guide for convenient recordkeeping. In addition, 14 references are listed. An appendix includes 12 beef cattle associations with addresses and telephone numbers for further information. The guide incorporates the needed components to aid agriculture teachers to implement Vocational Instructional Management System (VIMS), a framework to use in planning and organizing to ensure excellence in Missouri's vocational education system by focusing greater attention on the management of teaching and learning. The student reference contains information sheets and summaries for each of the lessons. (KC)

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ED 419 927

# Introduction to Beef Production
# Instructor Guide
# Student Reference

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Introduction to

# BEEF PRODUCTION

instructor guide

In cooperation with
Agricultural Education
Department of Practical Arts and Vocational-Technical Education
College of Education and College of Agriculture Food and Natural Resources
University of Missouri-Columbia

In cooperation with
Agricultural Education Section
Division of Vocational and Adult Education
Elementary and Secondary Education
Jefferson City, Missouri

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# INTRODUCTION TO BEEF PRODUCTION

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# FOREWORD

The development of the *Introduction to Beef Production* curriculum guide is the result of suggestions by the MVATA Teaching Aids Committee. The Beef Production Advisory Committee suggested the topics to be included and reviewed the materials.

This curriculum contains seven lessons. The instructor guide includes objectives, competencies, motivational techniques, teaching procedures, other activities, activity sheets, transparency masters, evaluations, answers to evaluations and activity sheets, references and teaching aids, and materials and equipment. Topics include an introduction to the beef industry, breeds of beef cattle, principles of beef cattle selection, production systems, herd health, herd management, and industry issues. One copy of the student reference is packaged with the instructor guide. Additional copies of the student reference can be purchased separately.

During the summer of 1981, the Missouri State Board of Education formally adopted the concept of "Instructional Management Systems" (IMS) as a priority for the 1981-82 school year. The Missouri Commissioner of Education described the IMS concept as a practical way of "organizing for excellence" in education. To meet the demand for greater productivity and accountability, the director of Vocational Education applied the elements of IMS to form the Vocational Instructional Management System (VIMS). The VIMS process provides a framework to use in planning and organizing to assure excellence in Missouri's vocational education system by focusing greater attention on the management of teaching and learning.

This guide incorporates the needed components to aid agriculture teachers in the implementation of VIMS. For ease of use, competencies/objectives have been included at the beginning of the guide as well as incorporated within each lesson. A competency profile has been provided in the front of the guide for convenient record keeping.

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# INTRODUCTION TO BEEF PRODUCTION

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COMPETENCIES/OBJECTIVES

1. Describe the importance of the beef industry in Missouri.
2. Identify the major beef breeds and their significance to the beef industry.
3. Utilize available information to select beef cattle.
4. Compare various beef production systems.
5. Develop a herd health program.

6. Identify management factors important to profitable beef production.

7. Evaluate issues of concern to the beef industry.

## EVALUATION

1. Give short, objective tests following each lesson and a more in-depth objective test at the conclusion of the unit.

2. Observe the changes in behavior as evidence of the improved ability of students to deal with problems in this unit using backgound information acquired from earlier units.

3. Observe students' attempts to solve similar problems in their supervised agricultural experience programs.

## REFERENCES AND MATERIALS

1. Student Reference

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2. Teacher References

   a. Books


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   3) Blakley, James, and David H. Bade. *The Science of Animal Husbandry.* 4th ed. Englewood Cliffs, N.J.: Prentice-Hall, 1985.

   4) Boggs, Donald L., and Robert A. Merkel. *Live Animal Carcass Evaluation and Selection Manual.* 4th ed. Dubuque: Kendall/Hunt Publishing Company, 1993.

   5) Ensminger, M. E. *Stockman's Handbook Digest.* Danville, Ill.: Interstate Publishers, Inc., 1992.

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   10) Thomas, Verl M. *Beef Cattle Production: An Integrated Approach.* Philadelphia: Lea and Febiger, 1963.

b. Pamphlets, magazines, etc.

1) MFA Incorporated Alliance Advantage Program. *MFA Alliance Advantage: Pathway to Profit.*

2) *Missouri Beef Quality Assurance Program.* Ashland: Missouri Cattlemen's Association, 1990.

c. Extension publications

1) *Freeze Branding Cattle (G2201).* University Extension agricultural publications, 1993.

2) *Understanding and Using Sire Summaries (G2032).* University Extension agricultural publications, 1993.

d. Internet resources

1) Henning, Jimmy C., Howell N. Wheaton, and Craig A. Roberts. "Tall Fescue." http://muextension.missouri.edu/xplor/agguides/crop/g04646.htm(23 Sept. 1997).

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4) resup_0697.html#QRU4697-1 (25 Sept. 1997).

5) National Cattlemen's Beef Association. "The Annual Beef Industry Environmental Stewardship Award Program." http://www.ncanet.org/esa_info/esa_qa.html (25 Sept. 1997).

6) National Cattlemen's Beef Association. "Cattle and Beef Handbook." http://www.ncanet.org/beef_handbook/nca4700.html (24 Sept. 1997).

7) "Questions and Answers: Beef and Forage Production." http://www.aac.msstate.edu/pubs/pub2023.htm;mark=4192,0,5 (23 Sept. 1997).

8) Rice, Duane N., and Douglas Robers. " Common Infectious Diseases That Cause Abortions in Cattle." http://ianrwww.unl.edu/ianr/pubs/extnpubs/animdis/g1148.htm#bacterial (6 Feb. 1997).

## Introduction to Beef Production
## Competency Profile

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**Directions:** Evaluate the student by checking the appropriate number or letter to indicate the degree of competency. The rating for each task should reflect **employability readiness** rather than the grades given in class.

**Rating Scale:**
**3 Mastered** - can work independently with no supervision
**2 Requires Supervision** - can perform job completely with limited supervision
**1 Not Mastered** - requires instruction and close supervision
**N No Exposure** - no experience or knowledge in this area

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**Introduction to Beef Production**

1. Describe the importance of the beef industry in Missouri
2. Identify the major beef breeds and their significance to the beef industry
3. Utilize the available information to select beef cattle
4. Compare various beef production systems
5. Develop a herd health program
6. Identify management factors important to profitable beef production
7. Evaluate issues of concern to the beef industry

Other:_____

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## Introduction to Beef Production

| Student Names | | | | | | | | | | | | | | |
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**Competencies**

1. Describe the importance of the beef industry in Missouri.
2. Identify the major beef breeds and their significance to the beef industry.
3. Use available information to select beef cattle.
4. Compare various beef production systems.
5. Develop a herd health program.
6. Identify management factors important to profitable beef production.
7. Evaluate issues of concern to the beef industry.

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 1: Introduction to the Beef Industry

Competency/Objective: Describe the importance of the beef industry in Missouri.

Study Questions

1. **What is the importance of the beef industry to Missouri?**
2. **How did the beef industry evolve in the United States?**
3. **What are commonly used beef cattle terms?**
4. **How do the segments of the beef industry differ?**
5. **What career opportunities are available in the beef cattle industry?**

References

1. *Introduction to Beef Production (Student Reference).* University of Missouri-Columbia: Instructional Materials Laboratory, 1997.
2. Transparency Master
   a) TM 1.1: Beef Cattle Industry Flow Chart
3. Activity Sheet
   a) AS 1.1: A Career in the Beef Industry

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 1: Introduction to the Beef Industry

TEACHING PROCEDURES

A. Introduction

The beef industry is a very important segment of agriculture in Missouri. This lesson will discuss the evolution of the industry in the United States and show the importance of beef cattle to Missouri. It will also discuss the segments of the beef industry and some careers available to people interested in the industry.

B. Motivation

Ask students which country leads the world in cattle numbers (India). Then ask the students where they think the United States ranks in numbers of cattle and where Missouri ranks nationally in beef cattle numbers (3rd and 2nd, respectively).

C. Assignment

D. Supervised Study

E. Discussion

1. Discuss the importance of beef cattle to Missouri. Explain that beef cattle convert forage to pounds of beef and that much of the land used for forages cannot be planted for grain production, so cattle production is the best use of this land.

**What is the importance of the beef industry to Missouri?**

a) Missouri ranks second nationally in number of beef cows.
b) More than 6 percent of U.S. cattle operations are found within the state.
c) More than four and a half million head of cows and calves are inventoried in Missouri each year.
d) Missouri ranks highly in the production of purebred beef cattle; several nationally recognized herds are located in Missouri.
e) Beef production is scattered statewide, with most of the cows in southwestern Missouri.
f) In 1995, Lawrence County ranked first in beef cow numbers.

2. Describe the evolution of the beef cattle industry in the United States. Discuss the fact that beef cattle are not native to this continent and had to be imported. Point out the importance of beef cattle production in the settlement of the western United States.

**How did the beef industry evolve in the United States?**

a) Christopher Columbus brought the first cattle to the New World.
b) The Spanish introduced the Longhorn breed into Mexico in the early 1500s.
c) The first known purebred breed to be imported were Shorthorns, which were brought to America in the 1780s.
d) Cattle drives brought Longhorn cattle out of Texas to cow towns from which cattle were shipped east.
e) The reduction of buffalo herds and the end of clashes with Native Americans helped open the Great Plains for beef production.
f) The fencing of the west with barbed wire led to the improvement of herds that could be managed more closely.

g) An emphasis on improving herds led to the importation of many modern beef breeds in the 1960s.

3. Point out to the class that each livestock production system has a unique set of terms. Ask students if there are any beef terms they do not understand. MU Guide Sheet G2030, "Beef Production Glossary: BIF Fact Sheet," has additional terms that may be of interest to students.

**What are commonly used beef cattle terms?**

a) Steer - castrated male
b) Heifer - young female that has not given birth to a calf
c) Bull - mature male
d) Cow - female that has given birth to a calf
e) Polled - genetically without horns
f) Feeder calf - term used for a male or female animal, from weaning until the calf is put into a feedlot
g) Replacement cattle - bulls and heifers that will be used to add to or replace existing breeding stock
h) Slaughter cattle - steers and heifers between 1,000 and 1,350 pounds that will be processed into beef

4. Discuss the four major segments of the cattle industry. Point out that Missouri produces many feeder calves that are shipped west to be fed out. TM 1.1 illustrates the segments in an industry flow chart.

**How do the segments of the beef industry differ?**

a) Purebred breeders produce genetically superior females and herd bulls to be used by commercial cow/calf producers to improve their stock.
b) Cow/calf producers produce steers and heifers, which they may sell at weaning to a backgrounder or feedlot operator as feeder calves.
c) Backgrounders graze the calves on forages, usually supplemented with small amounts of grain, until they are ready to go to the feedlot.
d) Feedlot operators purchase or custom feed calves from either the cow/calf producer or backgrounders; they feed the calves until they are ready for slaughter.

5. Emphasize the diversity of beef cattle career opportunities. Some careers require only a high school education, while others require advanced degrees and training. Have students use AS 1.1 to research a career in the beef cattle industry and report their findings to the class.

**What career opportunities are available in the beef cattle industry?**

a) Beef cattle producer
b) Ranch manager
c) Artificial insemination technician
d) Livestock order buyer
e) Veterinarian
f) Pharmaceutical sales representative
g) Equipment sales and services representative
h) Nutritionist
i) Feedlot operator
j) Livestock extension specialist
k) Biotechnology researcher

F. Other Activities

Have students research the history of beef production in another country, such as Argentina or Australia.

G. Conclusion

Though beef cattle are not native to the United States, their production has become very important to the agricultural industry. The beef industry is a vital part of agriculture in Missouri, which is ranked second in the nation in the number of beef cattle and has several nationally recognized purebred herds. Many career opportunities exist in the beef industry for people interested in this field.

H. Answers to Activity Sheets

AS 1.1

Answers will vary.

I. Answers to Evaluation

1. d
2. b
3. c
4. c

5. Christopher Columbus

6. Answers may include any five of the following: beef cattle producer, ranch manager, artificial insemination technician, livestock order buyer, veterinarian, pharmaceutical sales representative, equipment sales and services representative, nutritionist, feedlot operator, livestock extension specialist, biotechnology researcher.

7. A bull is a mature male, and a steer is a castrated male. A heifer is a young female that has not given birth to a calf.

UNIT - INTRODUCTION TO BEEF PRODUCTION Name _____

Lesson 1: Introduction to the Beef Industry Date _____

EVALUATION

**Circle the letter that corresponds to the best answer.**

1. Which industry segment is involved solely in grazing cattle on forages and small amounts of grain until the cattle are ready to be fed out?

   a. Cow/calf producers
   b. Purebred producers
   c. Feedlot producers
   d. Backgrounders

2. Where does Missouri rank in beef cattle numbers?

   a. First
   b. Second
   c. Third
   d. Fourth

3. Which industry segment produces genetically superior bulls and heifers to improve stock?

   a. Cow/calf producers
   b. Backgrounders
   c. Purebred producers
   d. Feedlot operators

4. How many cows and calves are inventoried in Missouri each year?

   a. More than two and a half million
   b. More than three and a half million
   c. More than four and a half million
   d. More than five and a half million

**Complete the following short answer questions.**

5. Who brought the first cattle to the New World?

6. What are five careers in the beef industry?

   a.

   b.

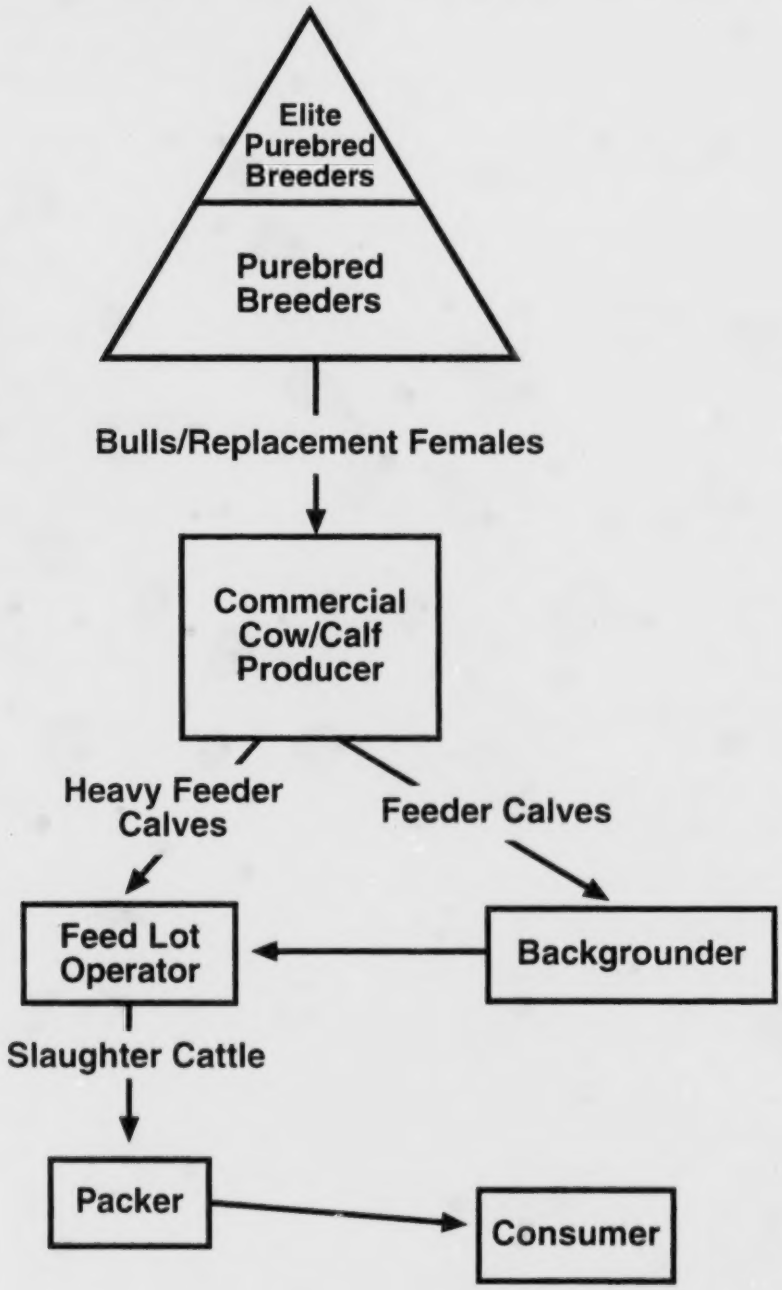
   c.

   d.

   e.

7. What is the difference between a bull, steer, and heifer?

# Beef Cattle Industry Flow Chart



Lesson 1: Introduction to the Beef Industry Name _____

**A Career in the Beef Industry**

**Objective:** Learn more about the beef industry by conducting an interview with someone in a career related to the industry.

**Interview a person with a career in the beef industry. Record his or her name, occupation, and place of employment. Use the questions on this sheet as an aid during the interview. Write down the answers to the questions, as well as any other information that is important. Then report about the career to the class.**

Name:

Occupation:

Place of Employment:

How long have you worked in your present occupation?

Why did you choose this career?

What training was necessary for this job?

What professional skills do you use?

What jobs have you previously had that helped prepare you for this one?

What other jobs have you considered?

What are your career plans for the future?

What advice would you give someone who is considering a career in this area?

Comments:

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 2: Breeds of Beef Cattle

Competency/Objective: Identify the major beef breeds and their significance to the beef industry.

Study Questions

1. **How do the *Bos indicus* and *Bos taurus* species of beef cattle differ?**
2. **What are the histories and identifying characteristics of beef breeds common in Missouri?**
3. **What are factors that influence breed selection?**

References

1. *Introduction to Beef Production (Student Reference).* University of Missouri-Columbia: Instructional Materials Laboratory, 1997.
2. Activity Sheets
   a) AS 2.1: Beef Breeds
   b) AS 2.2: Researching Beef Breeds

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 2: Breeds of Beef Cattle

TEACHING PROCEDURES

A. Review

Lesson 1 focused on the importance of beef cattle and the beef cattle industry. Although they are not native to the United States, beef cattle have become central to the agricultural industry. This lesson will discuss the breeds of cattle that are of particular importance in Missouri.

B. Motivation

1. Find a picture of a black breed of cattle other than Angus (such as black Limousin or black Salers) and have students try to guess what breed it is. Offering some type of reward for a correct answer will add to the impact.

2. Show students a picture of a crossbred animal and ask them to identify the beef breeds that went into its breeding.

C. Assignment

D. Supervised Study

E. Discussion

1. Ask students what the main differences are between different breeds that they have seen. Lead into a discussion of the two species of beef cattle, *Bos indicus* and *Bos taurus*.

**How do the *Bos indicus* and *Bos taurus* species of beef cattle differ?**

a) *Bos indicus*
   1) Originated from Zebu cattle from India
   2) Loose skin
   3) Large ears
   4) Humped
   5) Heat-resistant
   6) Insect-resistant

b) *Bos taurus*
   1) Originated in Europe
   2) Tight hides
   3) Small ears
   4) No humps
   5) More tolerant of cold weather

2. Ask students how many breeds of cattle they can name. Stress that there are more than 200 breeds worldwide. Narrow the focus to discuss the major breeds found in Missouri. Point out that these breeds are crossbred to produce calves with desirable attributes. Have students complete AS 2.1 and 2.2.

**What are the histories and identifying characteristics of beef breeds common in Missouri?**

a) Angus
   1) First imported from Scotland by George Grant of Kansas in 1873

2) Black
3) Polled
4) Maternal
5) High quality carcasses with a large degree of marbling

b) Red Angus
1) Red due to a recessive gene in black Angus
2) Same characteristics as black Angus

c) Beefmaster
1) Developed in Texas in 1931 by Tom Lasater
2) 1/4 Hereford, 1/4 Shorthorn, 1/2 Brahman
3) Red to almost white in color
4) Horned or polled
5) Good growth rate
6) Hardy
7) Maternal
8) Fertile

d) Brahman
1) Developed from Zebu cattle from India crossed with several European breeds
2) Gray to black in color
3) Loose hides
4) Large ears
5) Humped
6) Horned
7) Heat-resistant
8) Insect-resistant

e) Brangus
1) Developed in the United States in the early twentieth century
2) 5/8 Angus, 3/8 Brahman
3) Black
4) Polled
5) Maternal
6) High growth rate
7) Thick carcasses with a minimum of excess fat

f) Charolais
1) Introduced into the United States by the King Ranch in the 1930s
2) Originally developed in France
3) White
4) Horned or polled
5) Large
6) Heavily muscled
7) Fast-growing

g) Chianina
1) Originated in Italy
2) First used in the United States in the early 1970s
3) Used to produce show steers and as a terminal breed
4) Almost any color
5) Horned or polled
6) Fast growing
7) Extremely large

h) Gelbvieh
1) Originated in Germany
2) Imported in the early 1970s
3) Red to golden or black in color
4) Horned or polled
5) Gentle
6) Very maternal

i) Hereford
   1) Imported from England by Henry Clay in 1817
   2) Red with white face and chest; also white on the neck, feet, and switch
   3) Horned, but used to develop Polled Hereford breed
   4) Excellent foragers
   5) Tolerant of cold weather

j) Limousin
   1) Originated in France
   2) First introduced into the United States in the late 1960s
   3) Light red to dark red or black
   4) Horned or polled
   5) Lean
   6) Heavily muscled

k) Longhorn
   1) Originally from Spain
   2) Brought to Mexico and then Texas in the early 1500s
   3) Extremely hardy
   4) Almost any color or combination of colors
   5) Horned (spreading to four or more feet)
   6) Lean meat
   7) Adaptable to harsh environmental conditions
   8) Resistant to many diseases and parasites

l) Maine Anjou
   1) Originated in France
   2) Introduced to the United States around 1970
   3) Red and white, solid red, black, or black and white in color
   4) Horned or polled
   5) Heavily muscled
   6) Gentle
   7) Fast-growing
   8) Used extensively in producing show steers

m) Salers
   1) Originated in France
   2) Imported in the mid-1970s
   3) Black or dark cherry red in color
   4) Horned
   5) Easy-calving
   6) High-growth

n) Santa Gertrudis
   1) Developed on the King Ranch in Texas in the early twentieth century
   2) 5/8 Shorthorn, 3/8 Brahman
   3) Dark red
   4) Horned or polled
   5) Easy-calving
   6) Good foraging ability

o) Shorthorn
   1) Originated in England
   2) Imported in the late 1700s
   3) Red, white, red and white, or roan in color
   4) Horned or polled
   5) Highly maternal
   6) Gentle
   7) High-quality carcasses

p) Simmental
   1) Originally from Switzerland
   2) First imported in 1969

3) Solid red, red and white, yellow, black, or black and white in color
4) Horned or polled
5) Large
6) Fast-growing
7) Maternal
8) High milk production

3. Stress to students that each producer faces a different situation and different needs for cattle. These factors will affect what breed a particular producer will select.

**What are factors that influence breed selection?**

a) Needs of the producer
b) Breeds used in the past
c) Available feed and labor resources
d) Goals of the operation
e) Market trends
f) Traits of the breeds

F. Other Activities

1. Show students pictures of the different breeds of cattle discussed in this lesson and have them identify the breed.

2. Have students search the Internet for information on different breeds. Oklahoma State University has a website, located at http://www.ansi.okstate.edu/breeds, that covers many breeds of livestock, including dairy cattle.

G. Conclusion

The two species of cattle are *Bos indicus* and *Bos taurus*; all breeds of beef cattle belong to one of these two species or are some combination of the two. Many different breeds are found in Missouri. Producers must decide which breed best meets their needs when selecting a breed for production.

H. Answers to Evaluation

1. b
2. d
3. c
4. e
5. a
6. b
7. a

8. Answers may include any of the following: Angus, Brahman, Brangus, Chianina, Gelbvieh, Limousin, Longhorn, Maine Anjou, Salers, Simmental

9. Angus, Brahman

10. Answers may include any two of the following: Angus, Red Angus, Beefmaster, Brangus, Gelbvieh, Simmental, Shorthorn

11. Answers may include any two of the following: needs of the producer, breeds used in past, available feed and labor resources, goals of the operation, market trends, and traits of the breeds

UNIT - INTRODUCTION TO BEEF PRODUCTION Name _____

Lesson 2: Breeds of Beef Cattle Date _____

EVALUATION

**Match the name of the breed on the right with the best description on the left.**

| | | | |
|---|---|---|---|
| _____ 1. | Black and polled | a. | Limousin |
| _____ 2. | Red with white face | b. | Angus |
| _____ 3. | Originally from Spain | c. | Longhorn |
| _____ 4. | 1/4 Shorthorn | d. | Hereford |
| _____ 5. | Originated in France | e. | Beefmaster |

**Circle the letter that corresponds to the best answer.**

6. Which breed did Henry Clay introduce to America?

   a. Simmental
   b. Hereford
   c. Santa Gertrudis
   d. Shorthorn

7. *Bos indicus* cattle originated in which country?

   a. India
   b. United States
   c. Russia
   d. England

**Complete the following short answer questions.**

8. What are four breeds that can be black?

   a.

   b.

   c.

   d.

9. Which two breeds were used to develop the Brangus?

   a.

   b.

10. What are two maternal breeds of cattle?

    a.

    b.

11. What are two considerations when choosing a breed?

    a.

    b.

Lesson 2: Breeds of Beef Cattle Name _____

## Beef Breeds

**Objective:** Identify the distinguishing characteristics of major beef breeds.

**Fill in the table with information about each of the beef cattle breeds listed.**

| Breed Name | Color/Colors | When Imported/ Developed | Country of Origin/ Developer | Special Traits |
|---|---|---|---|---|
| Angus | | | | |
| Red Angus | | | | |
| Beefmaster | | | | |
| Brahman | | | | |
| Brangus | | | | |
| Charolais | | | | |
| Chianina | | | | |
| Gelbvieh | | | | |

| Breed Name | Color/Colors | When Imported/ Developed | Country of Origin/ Developer | Special Traits |
|---|---|---|---|---|
| Hereford | | | | |
| Limousin | | | | |
| Longhorn | | | | |
| Maine Anjou | | | | |
| Salers | | | | |
| Santa Gertrudis | | | | |
| Shorthorn | | | | |
| Simmental | | | | |

Lesson 2: Breeds of Beef Cattle Name _____

## Researching Beef Breeds

**Objective:** Become more familiar with the various breeds of beef cattle.

**Obtain the address of one of the major beef breed associations from your instructor. Write a letter to the association requesting information, pictures, videos, etc., for that breed.**

**When you receive the materials from the breed association, prepare a report for the class. Your report should answer the following questions.**

- What is the official name of the breed association?
- What is the history of the breed?
- When was the breed association formed?
- What are the standards for registration?
- What characteristics would disqualify an animal for registration?
- What are the important traits of the breed?

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 3: Principles of Beef Cattle Selection

Competency/Objective: Utilize the available information to select beef cattle.

Study Questions

1. **What are the parts of a beef animal?**
2. **What are the wholesale cuts of beef?**
3. **What criteria are used in the selection of slaughter and feeder cattle?**
4. **What criteria are used in the selection of breeding cattle?**
5. **What is the difference between crossbred and purebred breeding systems?**

References


1. *Introduction to Beef Production (Student Reference).* University of Missouri-Columbia: Instructional Materials Laboratory, 1997.


2. Transparency Masters

   a) TM 3.1a: Parts of a Beef Animal
   b) TM 3.1b: Parts of a Beef Animal (Overlay)
   c) TM 3.2: Wholesale Cuts of Beef
   d) TM 3.3: Thickness
   e) TM 3.4: U.S.D.A. Grades of Feeder Steers

3. Activity Sheets

   a) AS 3.1: Parts of a Beef Animal
   b) AS 3.2: Calculating Adjusted Weaning Weights
   c) AS 3.3: EPDs and the Performance of Limousin Bulls

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 3: Principles of Beef Cattle Selection

TEACHING PROCEDURES

A. Review

Lesson 2 described various breeds of cattle, focusing on the history and characteristics of each breed. Lesson 3 will focus on the importance of selection. Proper selection is critical for success in beef cattle production. Breeding cattle are selected for their future ability to produce quality offspring. Producers must select feeder and slaughter cattle wisely based on their physical characteristics in order to produce choice quality grade beef.

B. Motivation

1. Obtain a picture of a champion market steer from a major show (e.g., the Missouri State Fair) from a trade magazine or semen catalog. Discuss the value that the steer generated and how selection was a key to its success.

2. Allow students to participate in judging contests. Many area, district, and state livestock judging contests are open to agricultural education students.

C. Assignment

D. Supervised Study

E. Discussion

1. Discuss the importance of knowing the correct terms for various parts of the beef animal. Confusion can arise from trying to describe an animal using incorrect terminology. Use TM 3.1 to illustrate the parts of a beef animal. Have students complete AS 3.1.

**What are the parts of a beef animal?**

a) Muzzle
b) Face
c) Eye
d) Poll
e) Throat
f) Dewlap
g) Hoof
h) Dewclaw
i) Cannon bone
j) Knee
k) Forearm
l) Brisket
m) Shoulder
n) Loin
o) Heart girth
p) Ribs
q) Belly
r) Flank
s) Hock
t) Round
u) Rump
v) Hip bone
w) Tail head
x) Pin bones
y) Twist
z) Cod/udder
aa) Switch

2. Discuss the difference between a wholesale and retail cut of meat. Emphasize that the purpose of raising beef cattle is for food. Stress the fact that producers are not producing cattle but beef for human consumption. Use TM 3.2 to show the wholesale cuts.

**What are the wholesale cuts of beef?**

a) Round
b) Sirloin
c) Short loin
d) Rib
e) Chuck
f) Flank
g) Short plate
h) Brisket
i) Fore shank

3. Ask students to describe the difference between slaughter cattle and feeder cattle. Then survey students about what characteristics would be important to each type of animal. Use TM 3.3 and 3.4 to aid in the discussion of these characteristics.

**What criteria are used in selection of slaughter and feeder cattle?**

a) Slaughter cattle
    1) Muscling
        (a) Thicker cattle have more muscle thickness and width along their top line and through their rump and stifle.
        (b) Observe the size of the forearm, the thickness along the top of the calf, and thickness and depth of the quarter.
    2) Size
        (a) Size suggests the potential carcass weight of the animal.
        (b) Packers prefer a carcass weight of 600 to 850 pounds, with a live weight between 1,000 and 1,250 pounds.
    3) External fat
        (a) Cattle must have half an inch or less of external fat at the twelfth and thirteenth rib area to have the potential to reach choice quality grade.
        (b) Steers and heifers will have a smooth appearance along the ribs, pones of fat opposite the pin bones, and evidence of fat on the cod or udder region and through the brisket.
b) Feeder cattle
    1) Frame size
        (a) Frame size is determined by looking at height in relation to age.
        (b) Feeder steers and heifers may have a large, medium, or small frame.
        (c) Frame size is based on a prediction of what the live weight of the calf will be when it has half an inch of external fat in the twelfth and thirteenth rib area.
    2) Muscling
        (a) Feeder steers and heifers may have a muscle score of 1, 2, or 3, with the lower number indicating the more muscular animal.
        (b) Scores depend on the animal's thickness.

4. Ask students why selecting breeding animals carefully is important. Stress that breeding animals will have a long-term impact on a producer's herd because of females kept as replacements. Additional information about EPDs is available in MU Guide Sheet G2032 "Understanding and Using Sire Summaries: BIF Fact Sheet." Have students complete AS 3.1 and 3.2.

**What criteria are used in the selection of breeding cattle?**

a) Soundness
    1) Skeletal - Ease of movement
        (a) Taking long strides off both ends of the skeleton
        (b) Filling its track

(c) Setting feet down square and wide

2) Reproductive
   (a) Thirty-two centimeters of scrotal development in bulls at one year of age
   (b) Signs of development of the vulva and udder by breeding age in females

b) Volume/capacity
   1) Deep sided
   2) Wide ribbed
   3) Spring or curvature of rib cage

c) Muscling - Heavily muscled

d) Balance
   1) Long bodied
   2) Level topped
   3) Uniform in depth
   4) Stout boned
   5) Clean fronted

e) Performance values
   1) Actual weights - birth weight, weaning weight, yearling weight
   2) Feed to gain ratios

f) Frame score - height in relation to age
   1) Males larger than females
   2) Range from one to ten, with five to seven considered ideal

g) EPDs - expected progeny differences
   1) Birth weight (BW) EPD - prediction in pounds of the difference in birth weights
   2) Weaning weight (WW) EPD - prediction of the difference in pounds in weaning weights
   3) Yearling weight (YW) EPD - difference in pounds at one year of age
   4) Milk (M) EPD - difference in pounds in the weaning weights of the calves produced by the parent's female offspring due to the milk production of the cow

5. Ask students about the importance of proper selection for commercial producers using crossbreeding and for purebred breeders. For which is it more important? Discuss the differences between crossbred and purebred breeding systems.

**What is the difference between crossbred and purebred breeding systems?**

a) Crossbred breeding systems - Crossbreeding is mating in their herds animals of different breeds to take advantage of their different characteristics and produce offspring that display heterosis, or hybrid vigor. Producers buy purebred bulls to use. Most producers sell feeder calves or retain ownership through the feedlot. Daughters of bulls are kept as replacements.

b) Purebred breeding systems - Breeders use registered bulls and females of the same breed to produce bulls and females that will be purchased by other purebred breeders and commercial producers.

F. Other Activities

1. Use EPD information for a judging class.

2. Show a video on selection and judging, such as "Practice Cattle Judging" (CEV).

G. Conclusion

Selecting feeder, slaughter, and breeding animals is a complex task. However, producers can make wise choices if they keep in mind the traits needed by productive animals.

H. Answers to Activity Sheets

AS 3.1

1. Poll
2. Eye
3. Face
4. Muzzle
5. Throat
6. Dewlap
7. Brisket
8. Forearm
9. Knee
10. Cannon bone
11. Dewclaw
12. Flank
13. Hock
14. Switch
15. Round
16. Pin bones
17. Tail head
18. Rump
19. Hip bone
20. Loin
21. Shoulder
22. Belly
23. Ribs
24. Heart girth
25. Hoof
26. Cod/udder
27. Twist

AS 3.2

1. $\frac{600-75}{180} \times 205 + 75 + 0 = 673$ lbs.

2. $\frac{480-90}{180} \times 205 + 90 + 20 = 554$ lbs.

3. $\frac{390-70}{210} \times 205 + 70 + 54 = 436$ lbs.

4. $\frac{690-80}{210} \times 205 + 80 + 54 = 729$ lbs.

5. $\frac{515-79}{211} \times 205 + 79 + 40 = 543$ lbs.

AS 3.3

1. 2, 1, 4, 3 BW EPDs, low to high
2. 3, 4, 1, 2 WW EPDs, high to low
3. 4, 3, 1, 2 YW EPDs, high to low, or fastest growth to slowest growth. Cattle will be over one year of age when sold, so the YW EPD will be expressed.

I. Answers to Evaluation

1. d
2. g
3. i
4. b
5. h
6. e
7. a
8. c
9. f
10. j
11. d
12. b
13. a

14. Answers may include any three of the following: soundness, volume/capacity, muscling, balance, performance values, frame size, or EPDs.

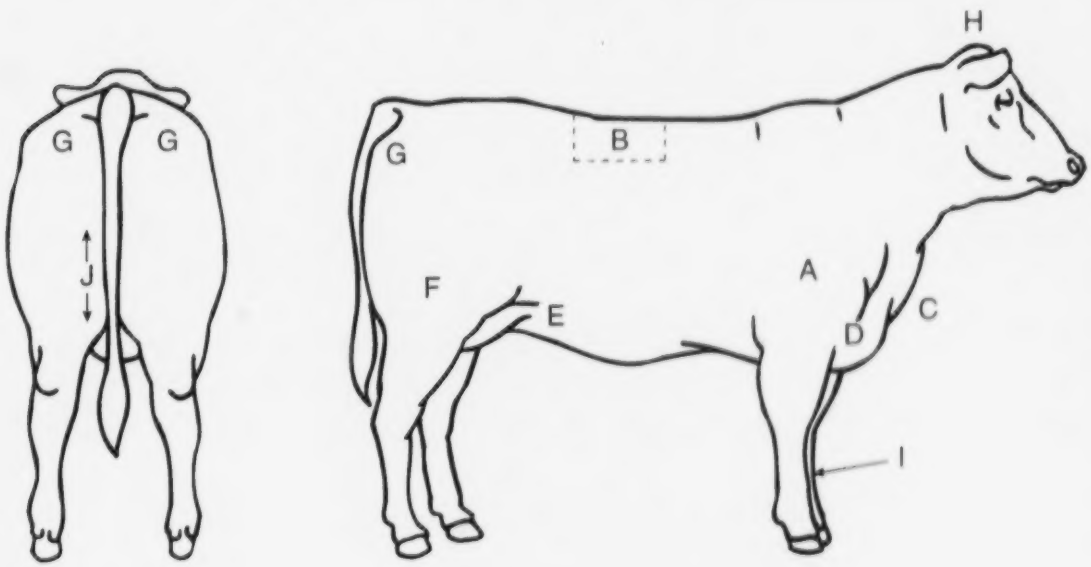
15. Producers use crossbred breeding systems to take advantage of the characteristics of different breeds and produce offspring that display heterosis, or hybrid vigor.

UNIT - INTRODUCTION TO BEEF PRODUCTION Name _____

Lesson 3: Principles of Beef Cattle Selection Date _____

EVALUATION

Write the letter from the diagram in the blank next to the name of that part of the beef animal.




1. _____ Brisket
2. _____ Pin bones
3. _____ Cannon bone
4. _____ Loin
5. _____ Poll
6. _____ Flank
7. _____ Heart girth
8. _____ Dewlap
9. _____ Round
10. _____ Twist



33

**Circle the letter that corresponds to the best answer.**

11. Which of the following is not a wholesale cut of beef?

    a. Loin
    b. Round
    c. Flank
    d. Shoulder

12. To have the potential to reach choice grade, slaughter cattle should have how much external fat around the twelfth and thirteenth ribs?

    a. ¼" or less
    b. ½" or less
    c. ¾" or less
    d. 1" or less

13. Which of the following muscle scores for feeder cattle indicates the most muscular animal?

    a. 1
    b. 2
    c. 3
    d. 4

**Complete the following short answer questions.**

14. What are three criteria used in the selection of breeding cattle?

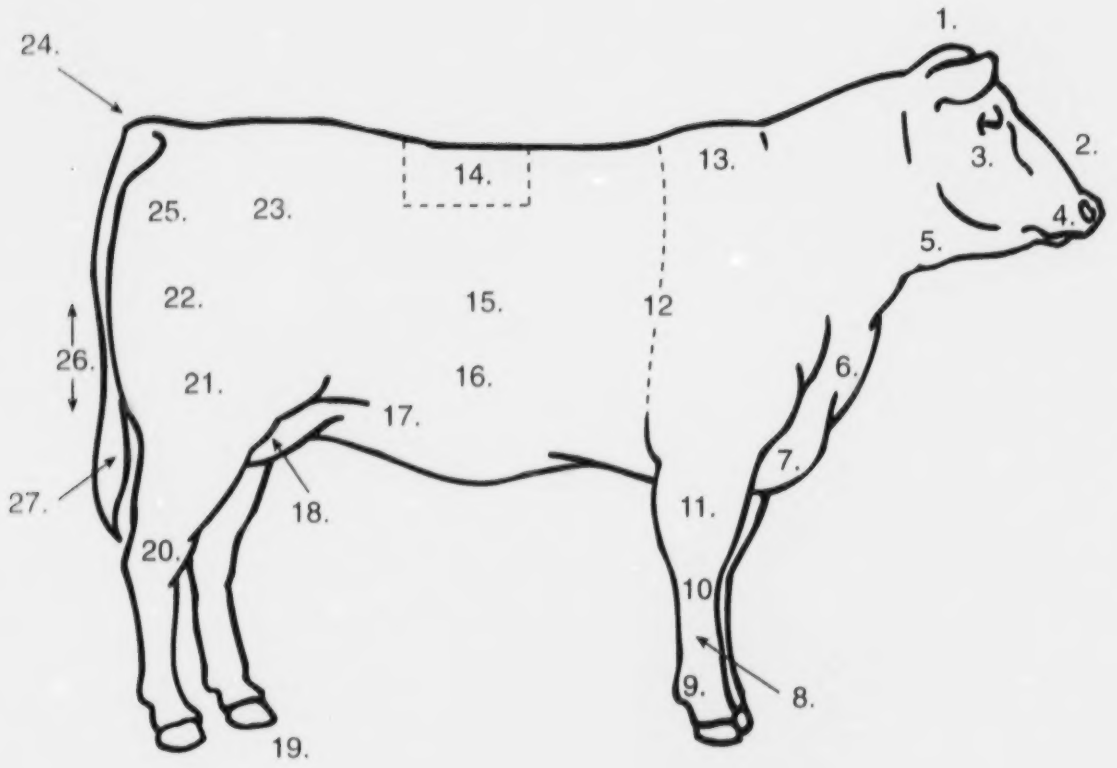
    a.

    b.

    c.

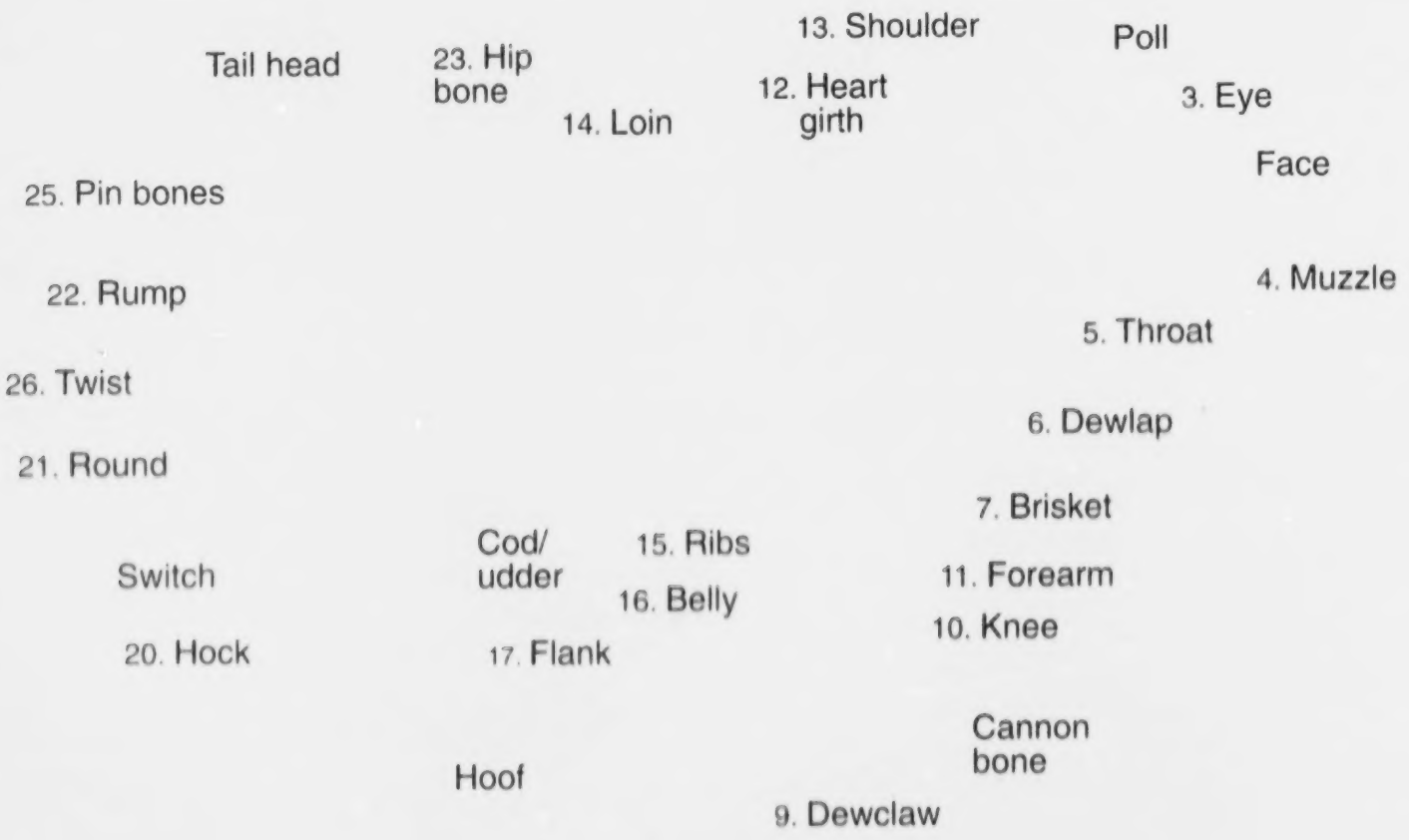
15. Why do producers use crossbred breeding systems?

# Parts of a Beef Animal



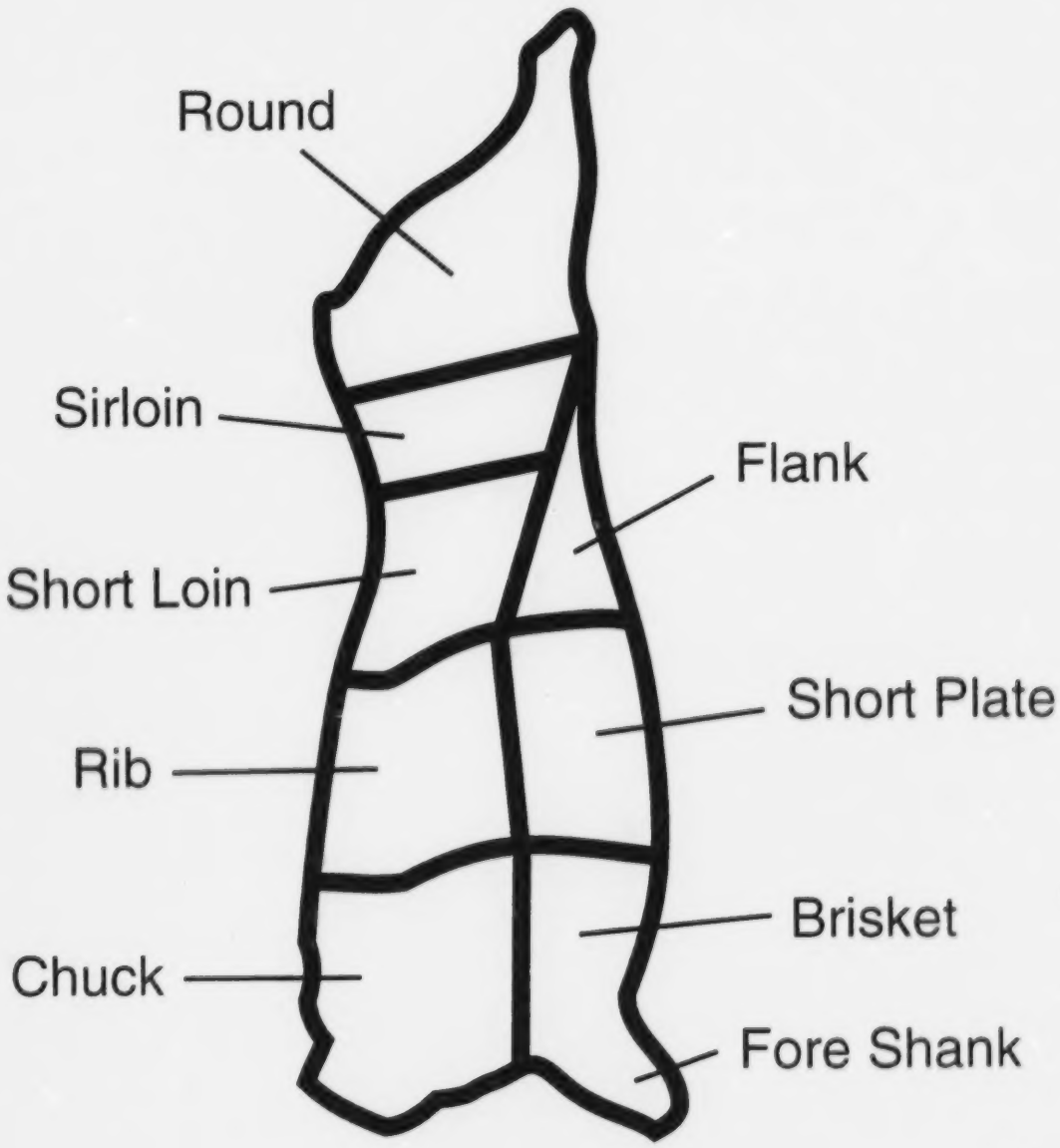

TM 3.1a

# Parts of a Beef Animal (Overlay)

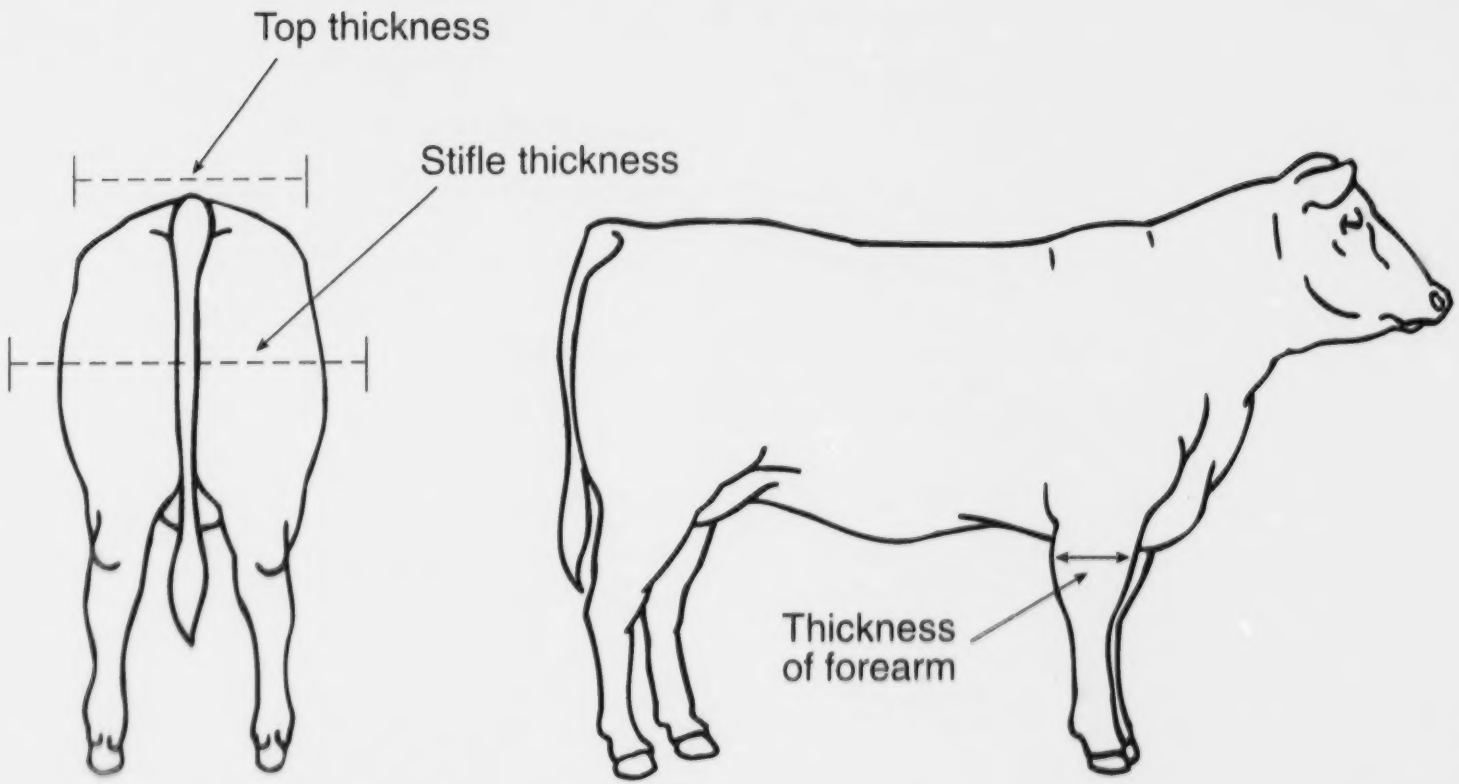



TM 3.1b

# Wholesale Cuts of Beef



# Thickness




41

45

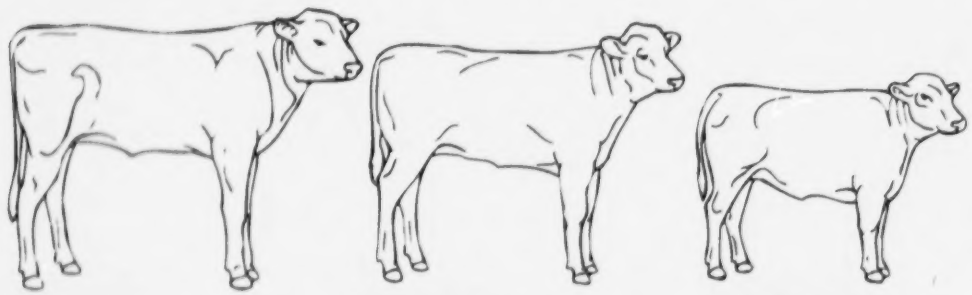
46

TM 3.3

# U.S.D.A. Grades of Feeder Steers

## Frame Size

Frame size is based on a prediction of the live weight of the animal when it reaches 1/2" of external fat in the area of the twelfth and thirteenth ribs.



**Large Frame**

- Tall and long for age
- At a half-inch of fat,
  steers will be 1200 lbs. or more
  heifers will be 1000 lbs. or more

**Medium Frame**

- Slightly tall and slightly long for age
- At a half-inch of fat,
  steers will be 1000-1200 lbs.
  heifers will be 850-1000 lbs.

**Small Frame**

- Small frame and shorter-bodied for age
- At a half-inch of fat,
  steers will be less than 1000 lbs.
  heifers will be less than 850 lbs.

## Muscle Thickness

**No. 1**

- Slightly thick throughout
- Moderate width between legs
- High proportion of beef breeding

**No. 2**

- Narrow throughout
- Legs set close together
- Back and loin have sunken appearance

**No. 3**

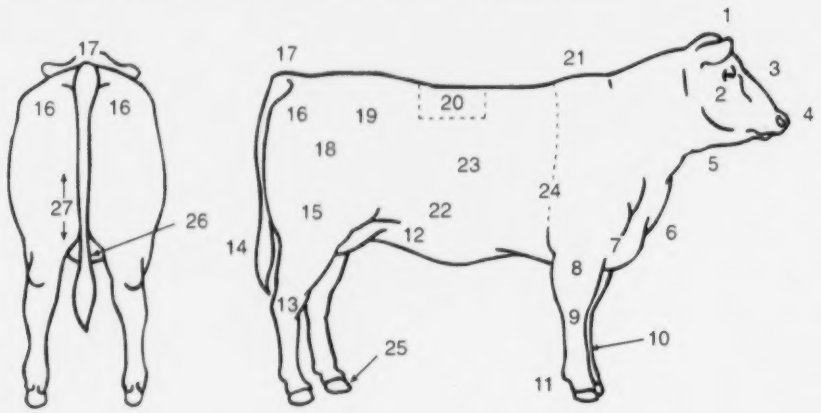
- Less thickness than No. 2
- Legs closer together than No. 2

Lesson 3: Principles of Beef Cattle Selection Name _____

## Parts of a Beef Animal

**Objective:** Identify the parts of a beef animal.

**Write the names of the parts of a beef animal in the numbered blanks.**




1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____
26. _____
27. _____

Lesson 3: Principles of Beef Cattle Selection Name _____

## Calculating Adjusted Weaning Weights

**Objective: Calculate adjusted weaning weights.**

$$\textit{Adjusted weaning weight} = \frac{\textit{actual weight} - \textit{birth weight}}{\textit{age (days)}} \times 205 + \textit{birth weight} + \textit{age of cow adjustment}$$

| Age of Cow Adjustment | | |
|---|---|---|
| Age (Years) | Adjustment for Male Calves | Adjustment for Female Calves |
| 2 | +60 | +54 |
| 3 | +40 | +36 |
| 4 | +20 | +18 |
| 5-10 | 0 | 0 |
| +11 | +20 | +18 |

**Using the formula and the age of cow adjustment given above, calculate the adjusted weaning weights for the calves in the following problems. Round to the nearest pound.**

Example: Calculate the adjusted weaning weight for a 200-day-old bull calf from a three-year-old cow. The calf had a birth weight of 80 pounds and now weighs 500 pounds.

$$\frac{500 - 80}{200} \times 205 + 80 + 40 = 550.5$$

The calf has an adjusted weaning weight of 551 lbs.

1. A six-month-old heifer calf had a birth weight of 75 pounds and now weighs 600 pounds. The cow was five years old.

2. A 180-day-old bull calf from a twelve-year-old cow currently weighs 480 pounds. Its birth weight was 90 pounds.

3. A two-year-old cow gave birth to a 70-pound heifer calf. The calf now is 210 days old and weighs 390 pounds.

4. A seven-month-old heifer calf with a birth weight of 80 pounds weighs 690 pounds. The cow was two years old at calving.

5. A bull calf from a three-year-old cow had a birth weight of 79 pounds. At 211 days old, it weighs 515 pounds.

Lesson 3: Principles of Beef Cattle Selection Name _____

**EPDs and the Performance of Limousin Bulls**

**Objective:** Use expected progeny differences to select bulls for breeding.

| Bull | BW EPD | WW EPD | YW EPD | Milk EPD |
|---|---|---|---|---|
| 1 | +1.0 | +15 | +25 | - 7 |
| 2 | -5.0 | - 5 | +13 | +10 |
| 3 | +6.0 | +49 | +50 | + 4 |
| 4 | +3.0 | +30 | +56 | + 2 |

**Use the information in the table to rank the bulls for breeding purposes.**

1. Rank the Limousin bulls as if you were selecting a bull to breed first-calf heifers. Explain your answer.

2. Rank the bulls as if you were purchasing a bull to use for breeding; all calves will be sold at weaning. Explain your answer.

3. Rank the Limousin bulls as if you were purchasing a bull to use in your herd. You currently keep steers and feed them until they reach 1,250 pounds and/or 15 months of age. Explain your answer.

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 4: Production Systems

Competency/Objective: Compare various beef production systems.

Study Questions

1. **What are the facility requirements for the different production systems?**
2. **How are forages used in each of the production systems?**
3. **What are the production costs for beef cattle?**
4. **How does one determine which production system to select?**
5. **What are the marketing options available for various production systems?**

References

1. *Introduction to Beef Production (Student Reference).* University of Missouri-Columbia: Instructional Materials Laboratory, 1997.
2. Transparency Master
   a) TM 4.1: Facilities
3. Activity Sheet
   a) AS 4.1: 90-Day Feeder Steer Budget

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 4: Production Systems

TEACHING PROCEDURES

A. Review

Selection, as discussed in Lesson 3, is one of the most critical components of beef cattle production. Certain basic traits are important when selecting slaughter, feeder, and breeding cattle. The purpose of selecting quality animals is to use them in a production system. Production systems, which will be discussed in this lesson, vary as to facilities, forage usage, costs, and marketing options.

B. Motivation

Ask students what types of facilities are needed in beef production. List them on the board. Discuss the high cost of facilities and how important careful planning of facilities is.

C. Assignment

D. Supervised Study

E. Discussion

1. Discuss the importance of well-planned, usable facilities. Then describe the basic facility needs for each production system.

**What are the facility requirements for the different production systems?**

a) Cow/calf
   1) Handling facilities
   2) Loading/unloading area
   3) Feed/hay storage
   4) Optional
      (a) Show/sale barn
      (b) Maternity barn
      (c) More elaborate handling/working facilities
      (d) Office

b) Purebred
   1) Handling facilities
   2) Loading/unloading area
   3) Feed/hay storage
   4) Optional
      (a) Show/sale barn
      (b) Maternity barn
      (c) More elaborate handling/working facilities
      (d) Office

c) Backgrounding
   1) Handling facilities
   2) Loading/unloading area

d) Feedlot
   1) Handling facilities
   2) Loading/unloading area
   3) Feed storage
   4) Feed mill

5) Feeding lots

2. Ask students why beef cattle can thrive on forages. Describe the ruminant stomach. Point out that some land is only suitable for grass production. Then list on the board how each production system uses forages.

**How are forages used in each of the production systems?**

a) Cow/calf producers - use forages year-round, either through grazing or as hay or haylage harvested in the summer for winter; may feed cattle on cornstalks or wheat pasture during the winter
b) Purebred producers - use forages year-round, either through grazing or as hay or haylage
c) Backgrounders - use forages either through grazing or as hay; may feed cattle on cornstalks or wheat pasture throughout the winter
d) Feedlot operators - often feed cattle on grass hay for a few days after they are received; may use haylages as a base diet, but most use corn silage and grain with protein supplements

3. Obtain a Missouri Department of Agriculture Weekly Market report with current prices. Ask the class what types of costs are incurred in raising beef cattle. List the costs on the overhead or board. Then discuss the current prices for cattle. Have students complete AS 4.1 to develop a sample budget for a cow/calf producer.

**What are the production costs for beef cattle?**

a) Fixed costs will be similar for all producers despite the type of production system used.
   1) Depreciation
   2) Interest on loans
   3) Repairs
   4) Taxes
   5) Insurance
b) Variable costs may differ depending on the type of production system.
   1) Feed
   2) Medications
   3) Veterinary expenses
   4) Equipment
   5) Facilities
   6) Cost of the stock

4. Emphasize to the class that beef production is hard work. Point out that large amounts of money can be invested in beef cattle with little guarantee of profit. Describe the importance of assessing individual talents and interests when selecting a production system. Point out that students are often better off starting small.

**How does one determine which production system to select?**

a) Little experience, capital, labor, and time
   1) Backgrounding
   2) Small cow/calf operation
b) Some experience, capital, labor, and time
   1) Large cow/calf operation
   2) Small purebred operation
c) Large amounts of experience, capital, labor, and time
   1) Larger purebred operation
   2) Feedlot operation

5. List local cattle markets on the board. Ask students if any differences exist between how cattle are marketed today and how they were marketed in the past. Describe the major terminal markets, such as St. Joseph or the St. Louis stockyard. Discuss the importance of communication and sales skills to purebred breeders.

**What are the marketing options available for various production systems?**

a) Cow/calf producers
   1) Auctions, including video auctions
   2) Retained ownership - The cow/calf producer owns the cattle through the feedlot until slaughter.
   3) Livestock order buyer - Buyers purchase cattle directly from producers.
   4) Alliance/marketing group - Producers form groups to market like sets of cattle together as a branded or labeled product.
   5) Cattle futures market - Futures contracts are bought and sold to help manage the financial risk involved in production.

b) Purebred producers
   1) Cattle futures market
   2) Private treaty sale - A producer and customer privately negotiate the terms of the sale.
   3) Consignment sale - A producer entrusts a group of animals to another party, such as a breed association, to be sold for a commission.
   4) Production sale - One producer or a small group of producers sells their animals at an auction that takes place on a farm.

c) Backgrounders
   1) Cattle futures market
   2) Auctions, including video auctions

d) Feedlot operators
   1) Cattle futures market
   2) Auctions
   3) Direct sales to packers based on the live weight or carcass grade of the cattle

F. Other Activities

1. Have students develop a map and building layout for an extensive beef cattle operation. Students should also research the cost of facilities.

2. Take a field trip to visit a local producer who has a well-planned, usable facility.

G. Conclusion

Production systems vary greatly in terms of the costs and the demands they place on the operator. Producers need to consider these factors when choosing a production system, and they should keep costs and potential profits in mind when running an operation. One very important factor to consider is the type of facilities needed, since they can be expensive to construct and so must be well planned and usable. Feed costs are also important, and using forages effectively is vital. To make a profit, producers should carefully evaluate the marketing options available to them and choose the best one.

H. Answers to Activity Sheets

AS 4.1

Costs:

Cattle - 100 steers x 500 pounds x 65¢ per pound = $32,500
Feed - 10 pounds x 90 days x 100 steers x 12¢ per pound = $10,800

Vaccinations - 100 steers × $3 = $300
Rent - 100 steers × 3 months × $5 = $1,500
Commission - 100 × $3 = $300
Total cost: $32,500 + $10,800 + $300 + $1,500 + $300 = $45,400

Projected returns: 99 steers × 635 pounds × $66 per pound = $41,490.90

Profit/Loss: $41,490.90 - 45,400.00 = -3,909.10 (loss)

Break-even price = $\frac{43,900}{(99 \times 635)} \times 100$ = $69.83 per 100 lbs.

I. Answers to Evaluation

1. d
2. d
3. c
4. a
5. b

6. Handling facilities and a loading/unloading area

7. Answers should include three of the following: auction (including video auctions), alliance/marketing group, livestock order buyer, retained ownership, cattle futures market.

8. Feedlot operators often feed cattle on grass hay for the first few days after they are received. They may use haylages as a base diet, but most use corn silage and grain with protein supplements.

UNIT - INTRODUCTION TO BEEF PRODUCTION Name _____

Lesson 4: Production Systems Date _____

EVALUATION

**Circle the letter that corresponds to the best answer.**

1. Which of the following expenses is a variable expense?

   a. Interest
   b. Repairs
   c. Insurance
   d. Equipment

2. What is a private treaty sale?

   a. A producer sells his or her animals at an auction that takes place on the farm.
   b. A producer sells his or her cattle through another party, such as a breed association.
   c. A producer allows a third-party to secretly negotiate the terms of a sale.
   d. A producer and customer privately negotiate the terms of the sale.

3. Which production system requires the fewest facilities?

   a. Cow/calf
   b. Purebred
   c. Backgrounding
   d. Feedlot

4. Which of the following is a fixed expense?

   a. Taxes
   b. Feed
   c. Medications
   d. Facilities

5. Producers with little knowledge of and experience with beef cattle may be best suited for what type of operation?

   a. Feedlots
   b. Backgrounding
   c. Small purebred operation
   d. Large cow-calf operation

**Complete the following short answer questions.**

6. What facilities are required for backgrounding cattle?

7. What are three different marketing options available to cow/calf producers?

   a.

   b.

   c.

8. How are forages used by feedlot operators?

# Facilities

| | |
|---|---|
| Cow/Calf | Handling Facilities<br>Loading/Unloading Area<br>Feed/Hay Storage |
| Purebred | Handling Facilities<br>Loading/Unloading Area<br>Feed/Hay Storage |
| Backgrounder | Handling Facilities<br>Loading/Unloading Area |
| Feedlot | Handling Facilities<br>Loading/Unloading Area<br>Feed Storage<br>Feed Mill<br>Feeding Lots |
| Optional | Maternity Barn<br>Show/Sale Barn<br>Office<br>More elaborate handling/working facilities |

Lesson 4: Production Systems Name _____

## 90-Day Feeder Steer Budget

**Objective:** Plan a budget covering the costs of raising feeder steers.

A producer is considering buying and backgrounding one hundred 500-pound feeder steers at $.65 a pound and wants to develop a budget showing projected costs to help decide whether to buy the steers. One hundred pounds of feed grain costs $12.00, and each steer will be fed ten pounds a day for 90 days. The steers are expected to gain one and a half pounds a day. Vaccination charges will be $3.00 a head. Pasture rent is $5.00 a head per month. The producer assumes that one of the steers will be lost due to death before sale. The sale barn charges a commission of $3.00 a head. The steers should sell at $.66 a pound.

**Develop a budget showing costs, total cost, projected returns, and profit or loss in the space provided below. Then calculate the break-even price for the producer. (Round to the nearest cent.)**

**Costs**

**Returns**

**Profit/loss**

**Break-even price**

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 5: Herd Health

Competency/Objective: Develop a herd health program.

Study Questions

1. **What are common health problems of beef cattle?**
2. **What type of herd health program is used for each production system?**
3. **What are the proper techniques for administration of medications and vaccines?**

References

1. *Introduction to Beef Production (Student Reference).* University of Missouri-Columbia: Instructional Materials Laboratory, 1997.
2. Transparency Masters
   a) TM 5.1: Herd Health Program Based on Spring Calving, March 1 to April 30
   b) TM 5.2: Routes of Administration
3. Activity Sheet
   a) AS 5.1: Information about Vaccines

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 5: Herd Health

TEACHING PROCEDURES

A. Review

Lesson 4 discussed different production systems, including their facility requirements, forage usage, production costs, and types of marketing systems. This lesson will focus on herd health programs for beef cattle. Producers need to be aware of the importance of proper disease prevention for profitable beef production.

B. Motivation

1. Obtain the video *Beef Quality Assurance* from the Missouri Cattlemen's Association, and show it to the class.

2. Bring in different types of animal health care products to begin a discussion.

C. Assignment

D. Supervised Study

E. Discussion

1. Ask students about their experiences with sick animals. List the diseases on the board along with symptoms and preventive measures.

**What are common health problems of beef cattle?**

a) Anaplasmosis
   1) Symptoms
      (a) Weight loss
      (b) Labored breathing
   2) Prevention and treatment
      (a) Controlling insects
      (b) Vaccines
      (c) Daily doses of antibiotics

b) Blackleg
   1) Symptoms
      (a) Swollen and inflamed muscles
      (b) Lameness
      (c) Crackling noise when gas under skin is pressed
   2) Prevention - vaccines

c) Bovine respiratory syncytial virus (BRSV)
   1) Symptoms
      (a) Discharge from the mouth and nose
      (b) Fever
      (c) Hacking cough
   2) Prevention - Vaccine

d) Bovine virus diarrhea (BVD)
   1) Symptoms
      (a) Diarrhea
      (b) Fever

(c) Coughing
(d) Nasal discharge

2) Prevention - vaccine

e) Brucellosis
1) Symptoms
(a) Abortions
(b) Sterility in cows and bulls
2) Prevention - vaccine

f) Fescue foot
1) Symptoms
(a) In severe cases, loss of one or both of the rear hooves, as well as the tips of the ears and tail
(b) Arched back
(c) Rough coat
(d) Stiffness or lameness
2) Prevention - mixing legumes with fescue

g) Grass tetany
1) Symptoms
(a) Trembling
(b) Staggering
2) Prevention and treatment
(a) Feeding magnesium supplements to cattle
(b) Intravenous administration of a solution containing magnesium and calcium

h) Infectious bovine rhinotracheitis (IBR, red nose)
1) Symptoms
(a) Respiratory form - fever, nasal discharge, reddened muzzle
(b) Reproductive form - Inflammation of the vagina and vulva and abortions
(c) Pinkeye - symptoms similar to pinkeye
2) Prevention - vaccine

i) Leptospirosis
1) Symptoms
(a) Fever
(b) Rapid respiration
(c) Poor appetite
(d) Jaundice
(e) Abortions
(f) Weak calves
(g) Stillbirths
2) Prevention - vaccine

j) Pinkeye
1) Symptoms
(a) Pinkish color to eye
(b) Watery eye
(c) White eye due to a cloudy film
2) Prevention
(a) Vaccines
(b) Fly control

k) Scours
1) Symptoms - diarrhea
2) Prevention
(a) Vaccines
(b) Good sanitation

l) Shipping fever
1) Symptoms
(a) High fever
(b) Coughing

(c) Difficulty in breathing
(d) Discharge from the eyes and nose

2) Prevention - vaccine

m) Vibriosis

1) Symptoms
(a) Abortion with no outward signs of disease
(b) Poor conception rates

2) Prevention - vaccine

2. Ask students if they have ever helped in vaccinating or treating a calf for a disease. Focus on the importance of proper techniques and a complete herd health program that emphasizes prevention. List the treatments needed for each type of production. TM 5.1 provides a herd health calendar for spring calving showing the timing of vaccinations and treatments for parasites.

**What type of herd health program is used for each production system?**

a) Cow-calf producers and purebred breeders

1) Feeder calves before weaning
(a) IBR
(b) PI3
(c) BVD
(d) BRSV
(e) Pasteurella
(f) Clostridial diseases (blackleg)
(g) External parasites
(h) Internal parasites

2) Replacement bulls and heifers - vaccinations usually given 30 days before breeding
(a) BVD
(b) IBR
(c) PI3
(d) Leptospirosis
(e) Vibriosis
(f) Hemophilus pneumonia
(g) Pasteurella
(h) Clostridial diseases
(i) Brucellosis (4- to 9-month-old heifers)
(j) External parasites
(k) Internal parasites

3) Mature cows and bulls
(a) Leptospirosis
(b) Vibriosis
(c) BVD
(d) IBR
(e) Clostridial diseases
(f) Internal parasites
(g) External parasites

b) Backgrounders and feedlot operators

1) IBR
2) PI3
3) BVD
4) BRSV
5) Pasteurella
6) Clostridial diseases
7) External parasites
8) Internal parasites

3. Have students think about the types of shots that they have received. Discuss the various methods of administering vaccines and other health products to animals. Emphasize that subcutaneous injections should be used whenever possible. Describe how a subcutaneous injection prevents tissue damage to the muscle of the calf. Use TM 5.2 to show routes of administration. Give students veterinary supply catalogs (such as the Jeffers catalog) and have them complete AS 5.1.

**What are the proper techniques for administration of medications and vaccines?**

a) Intramuscular (IM) - made into the muscle; should be given in the neck
b) Subcutaneous (Sub-Q) - given between the skin and muscle; should be given in the loose skin on the side of the neck
c) Oral or drench - administered by mouth
d) Intranasal (IN) - sprayed into the nasal cavity
e) Intravenous (IV) - administered into the jugular vein

F. Other Activities

1. Have students research the causes, symptoms, prevention, and treatment of diseases in greater detail. MU Guide Sheets and the Internet are both good sources of information.

2. Take a field trip to a local veterinarian's office. Have him or her discuss the importance of disease prevention.

G. Conclusion

Herd health is essential to the success of any beef operation. The local veterinarian and animal health supplier are valuable sources of advice and assistance in developing a herd health program. Most diseases can be prevented through proper vaccinations.

H. Answers to Activity Sheet

AS 5.1

Answers will vary.

I. Answers to Evaluation

1. a
2. b
3. d
4. c

5. An intranasal vaccine is sprayed into the nose.

6. Answers may include any four of the following: IBR, PI3, BVD, BRSV, pasteurella, and clostridial diseases.

UNIT - INTRODUCTION TO BEEF PRODUCTION Name _____

Lesson 5: Herd Health Date _____

EVALUATION

**Circle the letter that corresponds to the best answer.**

1. Diarrhea is a symptom of which of the following diseases?

   a. BVD
   b. IBR
   c. Shipping fever
   d. Pinkeye

2. Which of the following routes of administration is recommended when giving injectable vaccines?

   a. Intramuscular
   b. Subcutaneous
   c. Drench
   d. Intravenous

3. Which of the following diseases does not cause abortions?

   a. Brucellosis
   b. Vibriosis
   c. Leptospirosis
   d. Blackleg

**Complete the following short answer questions.**

4. How is an intranasal vaccine administered?

5. What are four diseases against which a feeder calf should be vaccinated?

   a.

   b.

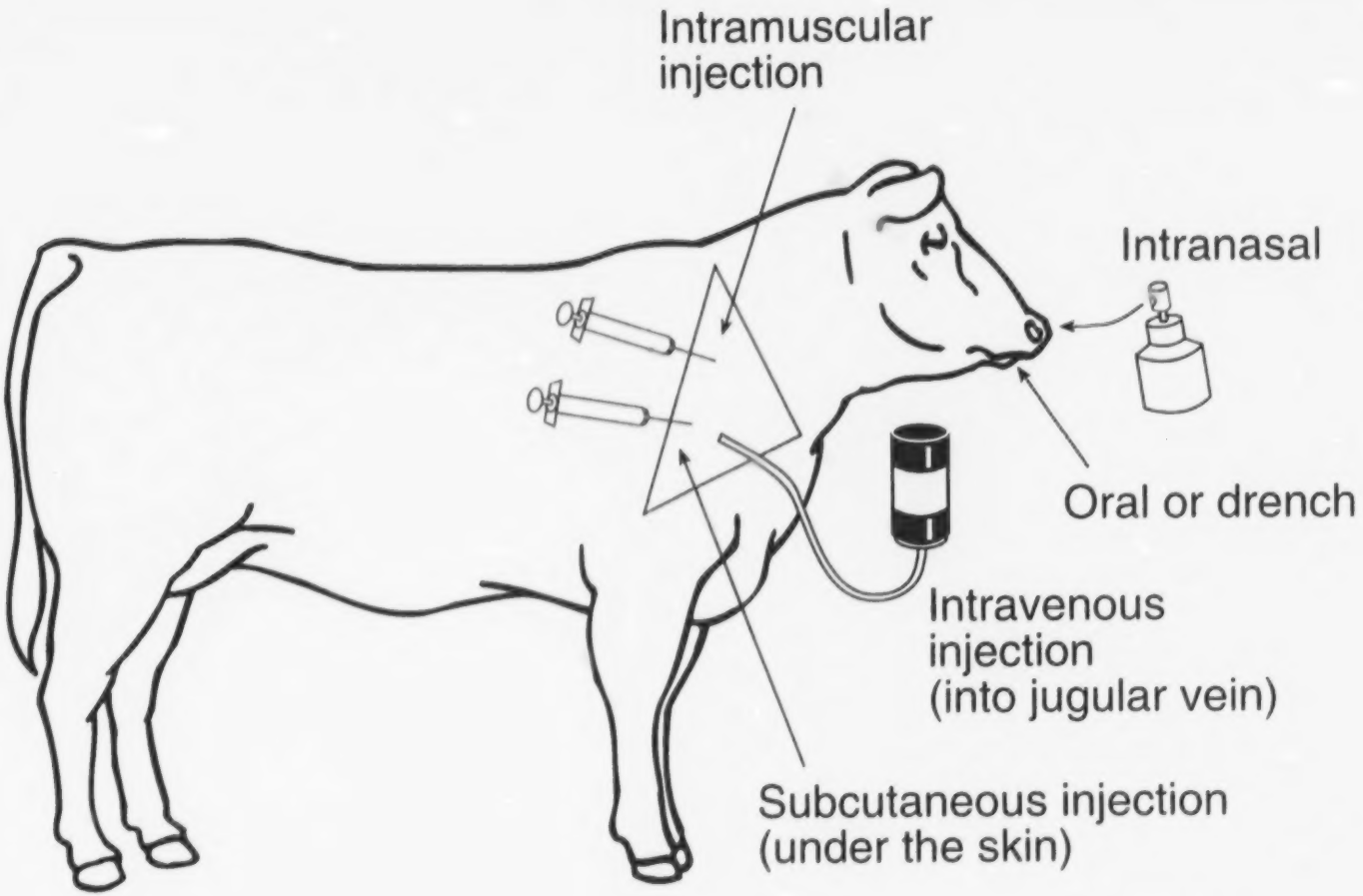
   c.

   d.

## Herd Health Program Based on Spring Calving, March 1 to April 30

| | |
|---|---|
| January | Provide high quality hay for cows. |
| February | Provide high quality hay for cows. |
| March | Check cows twice daily for new calves. Tag calves at birth. Treat calves for scours. |
| April | Check cows twice daily for new calves. Tag calves at birth. Treat calves for scours. Semen check herd bulls. |
| May | Vaccinate cows for IBR, BVD, clostridial diseases, leptospirosis, and vibriosis. Vaccinate bulls for IBR, BVD, clostridial diseases, leptospirosis, and vibriosis. Administer products for internal and external parasite control. |
| | May 21 - Turn bulls out |
| June | Vaccinate calves for clostridial diseases, PI3, BVD, IBR, and BRSV. Make sure fly control measures are in place. |
| July | Give booster shots for PI3, BVD, IBR, and BRSV. Maintain fly control. |
| | July 20 - Lock up bulls |
| August | Vaccinate heifers against brucellosis. Maintain fly control. Pregnancy check all cows; sell those that are open. |
| September | Wean calves. Vaccinate calves for pasteurella. Treat calves for internal and external parasites. Maintain fly control. |
| October | Provide high quality hay/forages for cows. |
| November | Provide high quality hay/forages for cows. |
| December | Provide high quality hay for cows. |

# Routes of Administration




TM 5.2

Lesson 5: Herd Health Name _____

## Information about Vaccines

**Objective:** Research vaccines available for treating diseases in beef cattle.

**Using a veterinary supply catalog that describes vaccines for beef cattle, complete the chart below.**

| Disease | Brand Name | Dosage | Price per Dose | Special Precautions |
|---|---|---|---|---|
| Blackleg | | | | |
| IBR | | | | |
| PI3 | | | | |
| BVD | | | | |
| BRSV | | | | |
| Leptospirosis | | | | |
| Vibriosis | | | | |

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 6: Herd Management

Competency/Objective: Identify management factors important to profitable beef production.

Study Questions

1. **How does nutrition affect herd health?**
2. **What are factors to consider in reproductive management?**
3. **What are identification methods for beef cattle?**

References

1. *Introduction to Beef Production (Student Reference).* University of Missouri-Columbia: Instructional Materials Laboratory, 1997.
2. Transparency Master
   a) TM 6.1: Gestation Table
3. Activity Sheet
   a) AS 6.1: Herd Management Calendar

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 6: Herd Management

TEACHING PROCEDURES

A. Review

Lesson 5 discussed common diseases of beef cattle, the development of a herd health program, and methods of administering health products. This lesson covers herd management practices. Meeting the nutritional needs of beef cattle is one of the most important aspects of managing a herd. Reproduction should also be managed closely to ensure maximum profits. A third management factor is choosing a method by which cattle can be identified for record keeping purposes.

B. Motivation

1. Ask students when herd bulls should be turned out with the cows to have calving begin on March 1 and end on April 30. Discuss their answers. Point out that beef cows have a gestation length between 280 and 290 days. Also, focus on the fact that cows will not experience estrus until 60 to 90 days after the birth of the calf.

2. Bring different items associated with livestock identification (ear tags, branding irons) to class to stimulate discussion.

C. Assignment

D. Supervised Study

E. Discussion

1. Describe the importance of proper nutrition to health and production. Refer to the nutrition unit for specific information about animal nutrition. Discuss possible diets used for beef cattle.

**How does nutrition affect herd health?**

a) Components of nutrition
   1) Energy (supplied by fats and carbohydrates)
   2) Protein
   3) Vitamins
   4) Minerals
   5) Water

b) Maintenance - involves replacing cells, repairing damaged cells, and fighting off diseases; requires a balanced diet with essential vitamins and minerals.

c) Production - increases nutritional needs
   1) Growth and development
   2) Gestation
   3) Lactation

2. Ask students to list various factors to consider when managing reproduction. Discuss the factors with the class. TM 6.1 shows a gestation table for cattle. Have students complete AS 6.1.

**What are factors to consider in reproductive management?**

a) Limit the calving season to 60 days to ensure uniformity at weaning.

b) Turn the bull out 60 to 90 days after the first calf is born and lock it up 90 days after the last calf to maintain the current calving cycle.
c) Evaluate bulls for breeding soundness by having their semen checked before turning them out with the cows; replace bulls that fail the exams to help ensure that cows will be bred.
d) Check for heat when using artificial insemination.
e) Check all females for pregnancy 60 days after the bull has been locked up; sell open cows.

3. Ask students how someone who is unfamiliar with a herd could find a sick animal in a group of cattle that have no form of identification. Discuss the various identification methods.

**What are identification methods for beef cattle?**

a) Ear tags - plastic tags that hang in the ear of the animal; can be removed if necessary
b) Tattoos - permanent form of identification in which numbers and a herd prefix are tattooed in the ear of the animal
c) Brands
    1) Fire brands - method of identification in which a hot branding iron is used to burn a number or symbol into the hide permanently
    2) Freeze brands - permanent method of identification in which a branding iron is placed in liquid nitrogen or dry ice and alcohol and then used to brand the calf; grows back with white hair

F. Other Activities

1. Bring in different types of ear tags and an ear gun and let the students practice applying the tags to cardboard cutouts of an ear.

2. Take a field trip to a local beef producer and let the students practice body condition scoring cows using the body condition scoring poster available from the Missouri Farmers Association.

G. Conclusion

Several factors are important in managing beef cattle effectively. Cattle require proper nutrition to maximize production and remain healthy. Reproduction should also be managed closely to ensure reproductive efficiency. Proper identification is necessary for record keeping purposes.

H. Answers to Activity Sheets

AS 6.1

TM 5.1 can be used as a basis for evaluating student answers.

I. Answers to Evaluation

1. d
2. a

3. They should be replaced to help ensure that cows will be bred.

4. Answers may include any four of the following: energy (from carbohydrates and fats), protein, vitamins, minerals, water.

5. Freeze branding involves placing the branding iron in liquid nitrogen or dry ice and alcohol to make it cold. White hair grows in after the branding. Fire brands involve using a branding iron heated in a fire. The iron burns away the hair to leave a brand.

UNIT - INTRODUCTION TO BEEF PRODUCTION Name _____

Lesson 6: Herd Management Date _____

EVALUATION

**Circle the letter that corresponds to the best answer.**

1. Nutritional needs are increased for all of the following except:

   a. Growth.
   b. Gestation.
   c. Lactation.
   d. Maintenance.

2. How long should the calving season be?

   a. 60 days
   b. 100 days
   c. Three months
   d. Does not matter

**Complete the following short answer questions.**

3. What should be done with bulls that fail breeding soundness exams? Why?

4. Balanced diets for beef cattle contain several components. What are four of the components?

   a.

   b.

   c.

   d.

5. How do freeze branding and fire branding differ?

# Gestation Table

| DATE OF SERVICE | Due Date | DATE OF SERVICE | Due Date |
|---|---|---|---|
| January 1 | October 10 | July 1 | April 9 |
| January 15 | October 24 | July 15 | April 23 |
| February 1 | November 10 | August 1 | May 9 |
| February 15 | November 24 | August 15 | May 24 |
| March 1 | December 8 | September 1 | June 10 |
| March 15 | December 22 | September 15 | June 24 |
| April 1 | January 8 | October 1 | July 10 |
| April 15 | January 22 | October 15 | July 24 |
| May 1 | February 7 | November 1 | August 10 |
| May 15 | February 21 | November 15 | August 24 |
| June 1 | March 8 | December 1 | September 9 |
| June 15 | March 24 | December 15 | September 23 |

*Adapted from the *Missouri Agricultural Record Book for Secondary Students*

Lesson 6: Herd Management Name _____

## Herd Management Calendar

**Objective:** Plan a herd management calendar.

Suppose that you have been asked to manage a 100-cow herd. The producer currently allows bulls to run with the cow herd all year, and the cows calve year round. The producer has been noticing a decrease in the number of calves born over the last several years and has had problems putting together large sets of calves that are similar in size for sale.

**Using the table provided, form a detailed plan for managing the herd more effectively. Give dates where applicable.**

| Month | Management Practices |
|---|---|
| January | |
| February | |
| March | |
| April | |
| May | |
| June | |
| July | |
| August | |
| September | |
| October | |
| November | |
| December | |

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 7: Industry Issues

Competency/Objective: Evaluate issues of concern to the beef industry.

Study Questions

1. **What are consumer concerns about the beef industry?**
2. **What is the difference between animals rights and animal welfare?**
3. **What is the beef industry doing to address consumer concerns?**

References

1. *Introduction to Beef Production (Student Reference).* University of Missouri-Columbia: Instructional Materials Laboratory, 1997.
2. Activity Sheet
   a) AS 7.1: Debating Animal Rights Versus Animal Welfare

UNIT - INTRODUCTION TO BEEF PRODUCTION

Lesson 7: Industry Issues

TEACHING PROCEDURES

A. Review

In Lesson 6, herd management, including proper nutrition, reproductive management, and identification of cattle, was discussed. Lesson 7 will focus on issues concerning the beef industry. The American consumer is the final customer of beef producers. Producers must keep in mind the image that beef production generates. The education of producers and consumers is necessary to promote beef as safe and wholesome.

B. Motivation

1. Ask students to discuss what the term animal welfare means to them.

2. Show the Purina Mills Consumer Awareness video, available from Purina Mills, to the class.

C. Assignment

D. Supervised Study

E. Discussion

1. Ask students what concerns consumers have about beef cattle and beef cattle production.

**What are consumer concerns about the beef industry?**

a) Food safety - Consumers are becoming increasingly concerned with bacterial and chemical contaminants and residues from growth hormones and antibiotics left in meat.
b) Environmental concerns - The American public is concerned with environmental issues, such as the pollution of groundwater and the overgrazing of public lands in the west.
c) Ethics - Cases of unethical showring practices, especially centered around ownership and the illegal use of performance-enhancing steroids, have attracted attention.
d) Animal rights - Some groups feel that animals have the same rights as humans.

2. Make two columns on the board and write down the differences between animal rights and animal welfare.

**What is the difference between animal rights and animal welfare?**

a) Animal rights - Animal rights activists feel that animals have rights and should not be used for food or research. Castration, dehorning, and vaccinations are all viewed as inhumane because they alter the animal from its original state and because many of them are done without anesthetics.
b) Animal welfare - Animal welfare is a concern for the well-being of animals used by humans. Producers are responsible for providing the food and shelter necessary for the animal. Most producers are in fact concerned with animal welfare.

3. Have students focus on what can or should be done to address these concerns. Focus on the need to educate producers and consumers about beef production. After the discussion, have students carry out the debate outlined on AS 7.1. Divide the class into two groups--one supporting animal

rights and the other advocating animal welfare. Allow the groups to research the subject in preparation for the debate. Moderate the debate for the students.

**What is the beef industry doing to address consumer concerns?**

a) Food safety
   1) Local, state, and national cattlemen's associations have developed voluntary programs that focus on correcting practices that might trouble consumers.
      (a) The Missouri Cattlemen's Association sponsors the Beef Quality Assurance Program with the goal of making producers aware of issues that affect the safety and wholesomeness of beef.
      (b) The Beef Quality Assurance program aims at educating producers about proper management practices, proper record keeping for drug usage, details about various growth hormones and vaccines used in beef cattle production, and the correct usage, dosage, and withdrawal times for hormones and vaccines.
   2) A new USDA inspection program to reduce bacterial contamination focuses on bacterial counts rather than visual inspection.

b) Environment
   1) The National Cattlemen's Beef Association presents several Environmental Stewardship Awards annually to producers who use innovative methods to protect natural resources.
   2) The Association's publications for consumers emphasize that beef production is environmentally friendly.

c) Ethics
   1) A major focus of many 4-H and FFA leaders has been to educate young people and their parents on the damaging impact of unethical showring practices.
   2) The Missouri State Fair has adopted the National Code of Show Ring Ethics formulated by the International Association of Fairs and Expositions; exhibitors must sign a form that guarantees that they will not violate the code, and if they do, they forfeit any prizes won and may be barred from exhibiting their animals.

d) Animal welfare
   1) The Beef Quality Assurance Program gives guidelines on how to handle and care for animals.
   2) The Missouri Beef Quality Assurance Program manual includes a Code of Ethics that stresses the humane treatment of cattle.
   3) Producers have relied on these industry associations to get the word out to consumers that beef producers care for the welfare of their animals.

F. Other Activities

Show students the videos *Cattlemen Care About the Environment* (7 min.), *Cattlemen Care About Animal Welfare* (10 min.), and *Cattlemen Care About Beef Safety* (12 min.). All of these videos are available from MVRC.

G. Conclusion

Producers must focus on addressing the concerns of consumers. Beef cattle producers must assure consumers that the beef they consume is a safe and wholesome product that was produced humanely and in a way that did not harm the environment. Producers must also concentrate on behaving ethically, especially in showring activities.

H. Answers to Evaluation

1. d
2. b

3. a
4. c

5. Animal welfare is a concern for the well-being of animals used by humans. Producers are responsible for providing food and shelter necessary for the animal. Animal rights activists feel that animals have the same inborn rights as humans and should not be used for food or research.

6. The goal of the Beef Quality Assurance Program is making producers aware of issues that affect the safety and wholesomeness of beef.

UNIT - INTRODUCTION TO BEEF PRODUCTION Name _____

Lesson 7: Industry Issues Date _____

EVALUATION

**Circle the letter that corresponds to the best answer.**

1. Which of the following is not a food safety concern of consumers?

   a. Bacterial contamination of beef products
   b. Residues in beef from antibiotics
   c. Hormone residues in their meat
   d. The right of cattle to receive medicines

2. What is one way that the concern about unethical behavior in the showring is being addressed?

   a. Passing federal laws that make all unethical showring practices illegal
   b. Educating young people about ethical issues through 4-H and FFA
   c. Emphasizing the need to spread information about animal rights to producers
   d. Educating consumers about how cattle are shown in the ring

3. Which of the following topics is addressed in the Beef Quality Assurance program sponsored by the Missouri Cattlemen's Association?

   a. Details about growth hormones and vaccines
   b. Unethical medical practices in the showring
   c. How medications used on cattle affect the environment
   d. The practice of working cattle unethically

4. Which of the following is an environmental concern held by consumers?

   a. The right of cattle to good grazing areas
   b. Overgrazing of private farmland
   c. Pollution of ground water
   d. How medications used on cattle affect the environment

**Complete the following short answer questions.**

5. How do animal welfare and animal rights differ?

6. What is the goal of the Beef Quality Assurance Program?

Lesson 7: Industry Issues Name_____

## Debating Animal Rights Versus Animal Welfare

**Objective:** Explore issues surrounding beef production.

**Your class will be conducting a debate about animal rights and animal welfare. Your instructor will assign you to a group to argue one position or the other. Use any available resources to find information that supports your argument. Your research should answer the following questions.**

- What do people mean when they use the words "animal rights?"
- What does the term "animal welfare" mean?
- What has prompted discussion about animal rights and animal welfare?
- How have animal rights and animal welfare affected agriculture?

**When you have completed researching your position, your instructor will moderate the debate.**

# BEEF CATTLE

**American Angus Association**
3201 Frederick Blvd., St. Joseph, MO 64506
**Richard L. Spader, Executive Vice President**
Phone: (816) 233-3101 Fax: (816) 233-9703
Registrations 214,261
1 - MT; 2 - NE; 3 - MO; 4 - SD; 5 - TX
Breed Publication: Angus Journal

**American Blonde d'Aquitaine Assn.**
P.O. Box 12341, N. Kansas City, MO 64116
**James A. Spawn, Executive Director**
Phone: (816) 421-1305 Fax: (816) 421-1991
Registrations 1,014
1 - TX; 2 - OK; 3 - KS; 4 - ND; 5 - MS
Breed Publication: The Blonde Bulletin

**American Brahman Breeders Association**
1313 La Concha Lane, Houston, TX 77054
**Jim Reeves, Executive Vice President**
Phone: (713) 795-4444 Fax: (713) 795-4450
Registrations 13,746
1 - TX; 2 - FL; 3 - LA; 4 - AL; 5 - AR
Breed Publication: The Brahman Journal,
P.O. Box 220, Eddy, TX 76524

**American Brahmousin Council, Inc.**
P.O. Box 12363, N. Kansas City, MO 64116
**James A. Spawn, Executive Director**
Phone: (816) 421-1318 Fax: (816) 421-1991
Registrations 300
1 - TX; 2 - OK; 3 - AR; 4 - MO; 5 - FL
Breed Publication: Brahmousin Connection

**American Chianina Association**
P.O. Box 890, Platte City, MO 64079
**Terry Atchison, Chief Executive Officer**
Phone: (816) 431-2808 Fax: (816) 431-5381
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1 - TX; 2 - SD; 3 - TN; 4 - OH; 5 - IA
Breed Publication: American Chianina Journal

**American Gelbvieh Association**
10900 Dover Street, Westminster, CO 80021
**Tom Brink, Executive Director**
Phone: (303) 465-2333 Fax: (303) 465-2339
Registrations 31,381
1 - SD; 2 - NE; 3 - KS; 4 - CO; 5 - MO
Breed Publication: Gelbvieh World

**American Hereford Association**
1501 Wyandotte, Kansas City, MO 64101
**Craig Huffhinef, Executive Vice President**
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Registrations 116,170
1 - TX; 2 - OK; 3 - KS; 4 - NE; 5 - MT
Breed Publication: The Hereford World

**American International Charolais Association**
P.O. Box 20247, Kansas City, MO 64195
**Dr. Bill Able, Executive Vice President**
Phone: (816) 464-5977 Fax: (816) 464-5759
Registrations 65,092
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Breed Publication: Charolais Journal

**American Maine-Anjou Association**
760 Livestock Exchange Bldg.
Kansas City, MO 64102
**John Boddicker, Executive Vice President**
Phone: (816) 474-9555 Fax: (816) 474-9556
Registrations 12,285
1 - TX; 2 - OK; 3 - IA; 4 - SD; 5 - NE
Breed Publication: Maine-Anjou "Voice"

**American Pinzgauer Association**
21555 State Route 698, Jenera, OH 45841
**Peg Meents, Office Secretary**
Phone: (800) 914-9883 Fax: (419) 326-8711
Registrations 1,747
1 - TX; 2 - TN; 3 - MN; 4 - FL; 5 - WA
Breed Publication: Pinzgauer Journal
Rt. 3, Box 72, Hawthorne, FL 32640

**American Red Poll Association**
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**Homer Carl, Jr., Executive Secretary/Treasurer**
Phone: (816) 842-3512 Fax: (816) 842-6931
Registrations 1,800
Breed Publication: Red Poll Beef Journal

**American Salers Association**
7383 S. Alton Way, Suite 103
Englewood, CO 80112-2302
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Phone: (303) 770-9292 Fax: (303) 770-9302
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Breed Publication: American Salers

**American Shorthorn Association**
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**Dr. Roger E. Hunsley, Executive Secretary/Treasurer**
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Breed Publication: Shorthorn Country

**American Simmental Association**
1 Simmental Way, Bozeman, MT 59715-9990
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Phone: (406) 587-4531 Fax: (406) 587-9301
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1 - TX; 2 - IA; 3 - MO; 4 - KS; 5 - SD
Breed Publication: The Register, 2 Simmental Way
Bozeman, MT 59715

**American Tarentaise Association**
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**James A. Spawn, Executive Director**
Phone: (816) 421-1993 Fax: (816) 421-1991
Registrations 1,876
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Breed Publication: The Tarentaise Journal

**Beefmaster Breeders Universal**
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San Antonio, TX 78213
**Wendell Schronk, Executive Vice President**
Phone: (210) 732-3132 Fax: (210) 732-7711
Registrations 47,067
1 - TX; 2 - TN; 3 - AR; 4 - LA; 5 - AL
Breed Publication: The Beefmaster Cowman,
11201 Morning Court, San Antonio, TX 78213

**Braunvieh Association of America**
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**Iola Doeschot, Executive Secretary**
Phone: (402) 421-2960 Fax: (402) 421-2994
Registrations 2,750

**International Brangus Breeders Association, Inc.**
P.O. Box 696020, San Antonio, TX 78269-6020
**J. Neil Orth, Executive Vice President**
Phone: (210) 696-8231 Fax: (210) 696-8718
Registrations 33,302
1 - TX; 2 - OK; 3 - AR; 4 - MS; 5 - MO
Breed Publication: Brangus Journal

**North American Limousin Foundation**
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**John W. Edwards, Executive Vice President**
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1 - TX, 2 - OK; 3 - MO; 4 - KY; 5 - CO
Breed Publication: Limousin World
P.O. Box 850870, Yukon, OK 73085

**Red Angus Association of America**
4201 I-35 N., Denton, TX 76207-3415
**Dr. Richard P. Gilbert, Executive Secretary**
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Registrations 30,030
Breed Publication: American Red Angus

**Santa Gertrudis Breeders International**
P.O. Box 1257, Kingsville, TX 78364
**Dr. Joe Garrett, Executive Director**
Phone: (512) 592-9357 Fax: (512) 592-8572
Registrations 14,700
1 - TX; 2 - AL; 3 - GA; 4 - FL; 5 - NC
Breed Publication: Santa Gertrudis World, 1120 Blue
Mound Rd., Fortworth, TX 76131-1406

**Texas Longhorn Breeders Association of America**
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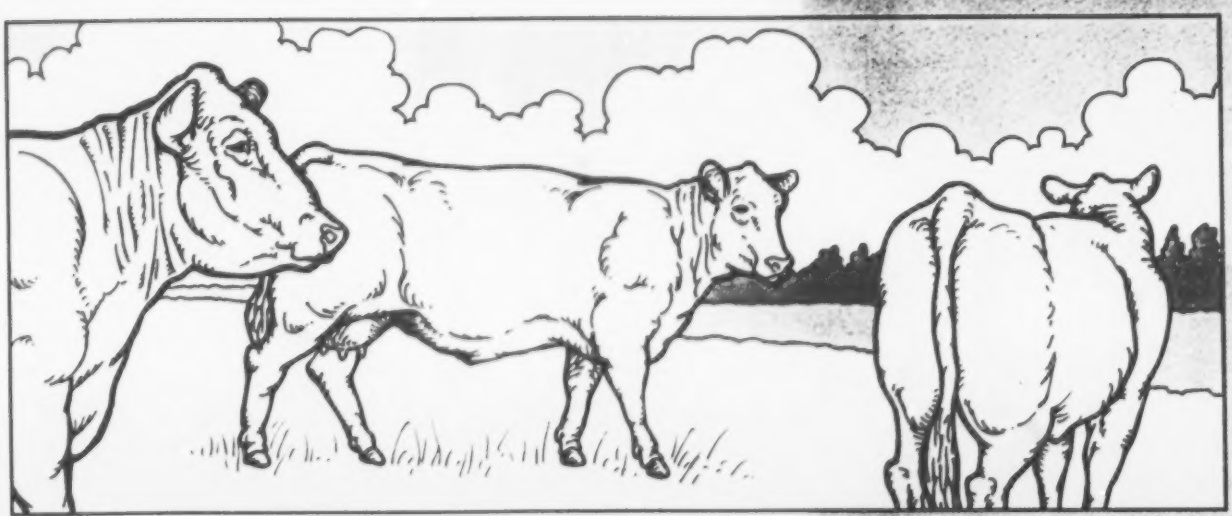
**Don L. King, Executive Director**
Ph. (817) 625-6241 Fax: (817) 625-1388
Registrations 12,500
1 - TX; 2 - OK; 3 - KS
Breed Publication: TLBAA Trails

Introduction to

# BEEF PRODUCTION

student reference



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Student Reference

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# FOREWORD

The development of the *Introduction to Beef Production* curriculum guide is the result of suggestions by the MVATA Teaching Aids Committee. The Beef Production Advisory Committee suggested the topics to be included and reviewed the materials.

This student reference contains seven lessons. Topics include an introduction to the beef industry, breeds of beef cattle, principles of beef cattle selection, production systems, herd health, herd management, and industry issues. An instructor guide can be purchased separately.

During the summer of 1981, the Missouri State Board of Education formally adopted the concept of "Instructional Management Systems" (IMS) as a priority for the 1981-82 school year. The Missouri Commissioner of Education described the IMS concept as a practical way of "organizing for excellence" in education. To meet the demand for greater productivity and accountability, the director of Vocational Education applied the elements of IMS to form the Vocational Instructional Management System (VIMS). The VIMS process provides a framework to use in planning and organizing to assure excellence in Missouri's vocational education system by focusing greater attention on the management of teaching and learning.

The instructor guide to accompany this student reference incorporates the needed component parts to aid agriculture teachers in the implementation of VIMS.

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Secondary Education

# INTRODUCTION TO BEEF PRODUCTION

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The production of beef cattle accounts for nearly half of all livestock receipts in the United States. Beef production takes place nationwide, with many animals raised in the Midwest, Southwest, and the western plains. The United States ranks third in beef numbers, with India and the former Soviet Union ranking first and second, respectively.

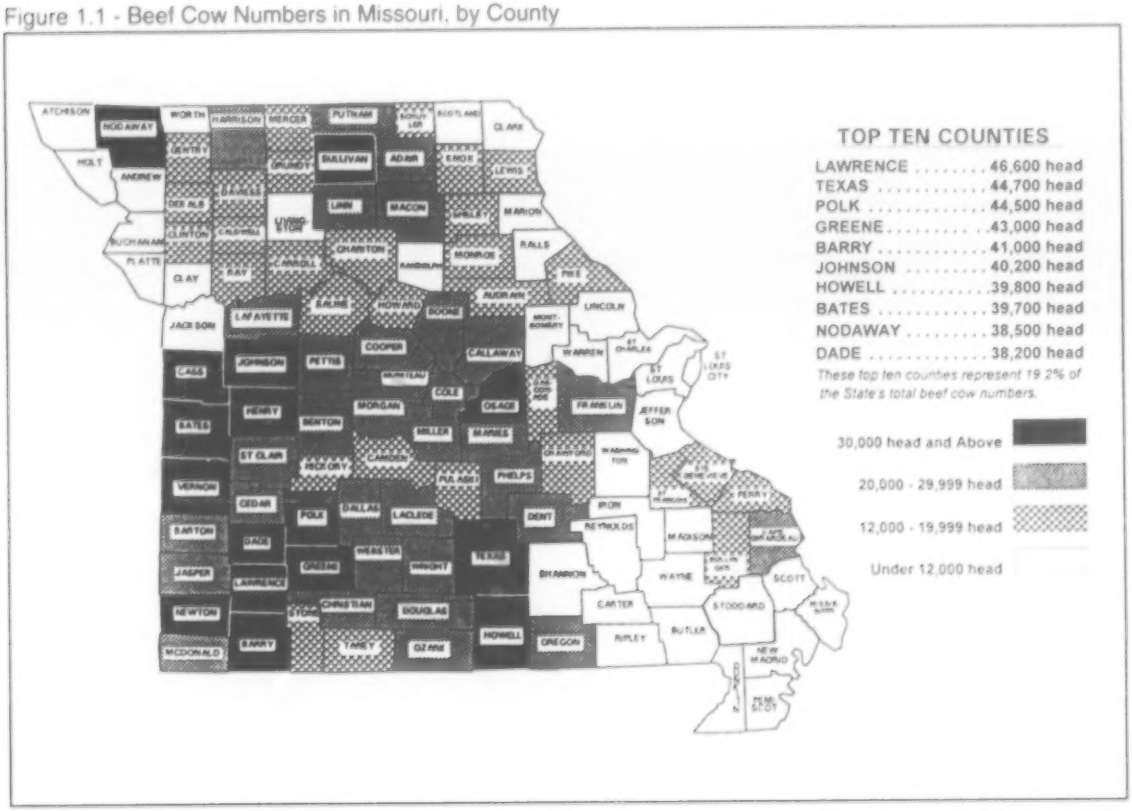
Beef cattle production is increasingly popular in the United States. The main reason for its popularity is that beef cattle can use forages as their major feed source, since they are ruminants with a four-part stomach that allows them to digest large amounts of roughage. Millions of acres nationwide cannot be used for crop production because of poor soil type, steep slope, or lack of suitable rainfall. However, the land can support grass, which in turn can be used by beef cattle. Producers market their forage crops through the sale of cattle. Also, beef cattle generally require less labor than other animals and have fewer losses due to deaths.

The production of beef cattle is not without its problems. It can be a high-risk occupation, especially when grain prices are extremely high and market prices for cattle are low. Beef cattle are also not as efficient as other animals in converting feed to meat. Average feed conversion ranges from 6:1 to 9:1, which means it takes six to nine pounds of feed for the animal to gain one pound of weight.

**Beef Production in Missouri**

Missouri is among the nation's leaders in beef cattle production. As of 1995, Missouri ranked second nationally in total number of beef cows, with more than 6 percent of U.S. cattle operations found within the state. More than four and a half million head of cattle and calves are inventoried in Missouri each year. The state continues to rank highly in the production of purebred beef cattle; several nationally recognized herds are located in Missouri. Beef production is scattered statewide, although most beef cows are in the southwestern part of the state (see Figure 1.1). As of January 1, 1996, Lawrence County ranked first in beef cow numbers with 46,600 head.

Figure 1.1 - Beef Cow Numbers in Missouri, by County


TOP TEN COUNTIES
LAWRENCE ..... 46,600 head
TEXAS ..... 44,700 head
POLK ..... 44,500 head
GREENE ..... 43,000 head
BARRY ..... 41,000 head
JOHNSON ..... 40,200 head
HOWELL ..... 39,800 head
BATES ..... 39,700 head
NODAWAY ..... 38,500 head
DADE ..... 38,200 head
These top ten counties represent 19.2% of the State's total beef cow numbers.
30,000 head and Above
20,000 - 29,999 head
12,000 - 19,999 head
Under 12,000 head



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**Beef Facts**

Birth weight - 60 to 100 pounds

Body temperature - 101.5° F (average)

Feed to gain ratio - 6:1 to 9:1

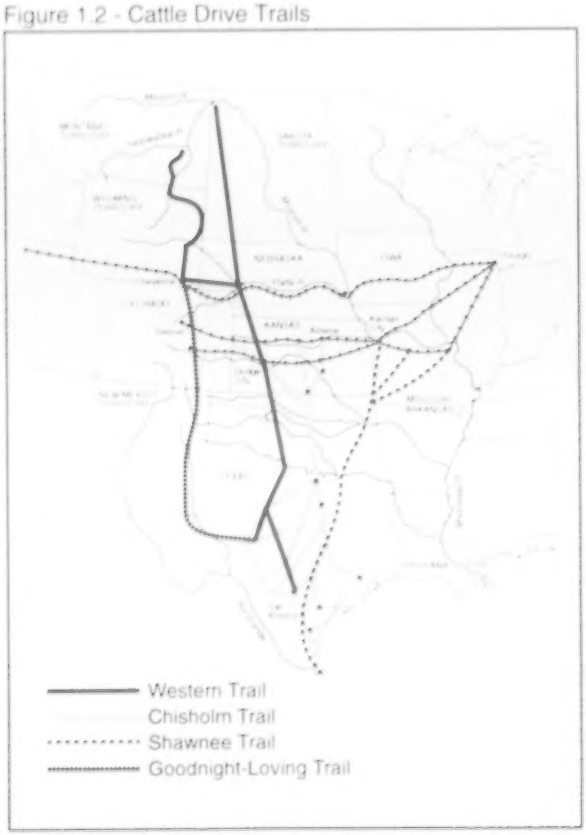
Weaning weight - 400 to 600 pounds

Slaughter weight - 1,000 to 1,350 pounds

**The History of Beef Cattle in the United States**

Beef cattle are not native to the United States. Christopher Columbus brought the first cattle to the New World on his second voyage. The Spanish introduced the Longhorn breed into Mexico in the early 1500s. Europeans who settled in what would one day become the United States brought cattle with them as well. The Jamestown settlers, for example, brought many cattle to the United States in 1611. The first known purebred breed of cattle to be imported were Shorthorns, which were brought to the United States during the 1780s. As pioneers traveled westward to settle new land, they took cattle with them.

Figure 1.2 - Cattle Drive Trails




After the Civil War, cattle drives from Texas to cow towns like Kansas City and Abilene took place on famous trails such as the Shawnee, Chisholm, and Western trails, shown in Figure 1.2. The Longhorn cattle brought north in these drives were shipped by railroad to the eastern United States, where most of the people lived.

The reduction of buffalo herds and the end of the clashes with Native Americans helped open the Great Plains for beef production. Cattle production flourished west of the Mississippi River because the vast grasslands of the Great Plains provided good grazing. The fencing of the West with barbed wire broke up the open grasslands and allowed herds to be improved for more efficient production by producers who could manage them more closely. This emphasis on improved herds and production eventually led to the importation of many modern beef breeds, such as Simmentals and Limousins, in the 1960s.

**Terminology**

The beef industry has a unique language all its own. Individuals involved with beef cattle should understand and use this terminology correctly. The following are some commonly used terms.

Steer - Castrated male.

Heifer - Young female that has not given birth to a calf.

Bull - Mature male.

Cow - Female that has given birth to a calf.

Polled - Genetically without horns.

Feeder calf - Term used for a male or female animal from weaning until the animal is placed in a feedlot.

Replacement cattle - Bulls and heifers that will be used to add to existing breeding stock.

Slaughter cattle - Steers and heifers between 1,000 and 1,350 pounds that will be processed into beef.

**Segments of the Beef Industry**

The beef industry can generally be divided into four major segments: purebred breeders, cow/calf producers, backgrounders, and feedlot operators. Purebred producers specialize in the production of genetically superior females and herd bulls that commercial cow/calf producers will ultimately use to improve their stock. Cow/calf producers generate income by raising steers and heifers to sell. They generally breed cows to calve in the early spring or early fall and wean the calves at five to seven months of age. Cow/calf producers may then sell the calves to a backgrounder or a feedlot operator as feeder calves. Backgrounding operations allow the weaned calves to graze on forages, usually supplemented with small amounts of grain, to produce cattle that are ready to put on full feed in a feedlot. The calves are generally purchased weighing 400 to 600 pounds and backgrounded until they weigh 700 to 900 pounds. Feedlot operators purchase calves from either cow/calf producers or backgrounding operations and feed them until they weigh between 1,000 and 1,350 pounds and are ready for slaughter. Cow/calf producers and backgrounders also have the option of retaining ownership of the cattle through the feedlot and allowing the feedlot operator to custom feed the animals. Custom feeding refers to the practice of feeding the cattle for the owner and charging a certain price per pound of gain as well as other fees. When they are ready for slaughter, the animals are sold to a packer to be processed into beef.

**Careers in the Beef Industry**

The career possibilities relating to beef cattle production are widely varied. Becoming a beef cattle producer is only one option available to individuals interested in the beef industry. For example, ranch managers are in charge of a cattle operation and must make day-to-day decisions about the operation of the ranch. Artificial insemination technicians perform artificial insemination on beef cattle for producers. Livestock order buyers buy cattle off the farm or at auction markets for other people, who provide the funds for the purchase. Veterinarians help maintain healthy and productive animals and respond to health emergencies. Pharmaceutical sales representatives sell livestock vaccines to producers. Equipment sales and service representatives sell and service equipment used by producers for cattle production. Nutritionists help formulate feeding programs for beef cattle. Feedlot operators manage all aspects of the process of feeding cattle for slaughter. Livestock extension specialists provide producers with support and information concerning all aspects of beef production from marketing to herd health. Biotechnology researchers work to find cures for diseases and innovative means to improve production.

**Summary**

Beef cattle are extremely important to agriculture in Missouri and the nation. The state ranks second nationally in beef cow numbers. In spite of their importance today, cattle are not native to the United States. The early explorers and settlers brought them to the continent. In the nineteenth century, beef production became a major industry on the western grasslands of the United States. Beef production has evolved since then into an industry consisting of four sectors: purebred breeders, cow/calf producers, backgrounders, and feedlot operators. Many career opportunities currently exist in the industry.

**Credits**

*1996 Missouri Farm Facts.* Columbia: Missouri Agricultural Statistics Service in cooperation with the Missouri Department of Agriculture and the U.S. Department of Agriculture, 1996.

Baker, Meelee, and Robert E. Mikesell. *Animal Science Biology and Technology.* Danville, Ill.: Interstate Publishers, Inc., 1996.

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Lee, Jasper S., et al. *Introduction to Livestock and Poultry Production.* Danville, Ill.: Interstate Publishers, Inc., 1996.

Taylor, Robert E. *Beef Production and the Beef Industry.* Minneapolis: Burgess Publishing Company, 1984.

Taylor, Robert E., and Ralph Bogart. *Scientific Farm Animal Production.* 3rd ed. New York City: Macmillan Publishing, 1988.

Thomas, Verl M. *Beef Cattle Production: An Integrated Approach.* Philadelphia: Lea and Febiger, 1963.

Beef cattle had to be imported to the United States. Importation began in the late 1400s and continues through the present. The purpose of importing new breeds is to add to the genetic stock available to improve herds.

**Beef Species**

The two species of cattle are *Bos indicus* and *Bos taurus*. *Bos indicus* breeds originated from Zebu cattle from India. They have loose skin, large ears, and humps over their shoulders. *Bos indicus* cattle are heat- and insect-resistant and are well suited to hot, humid climates. They are more rarely used than *Bos taurus* breeds. *Bos taurus* cattle originated in Europe. In comparison to *Bos indicus* species, they have tight hides and small ears. *Bos taurus* cattle do not have humps. They are more tolerant of cold weather. Most cattle raised in the United States are *Bos taurus* breeds. Examples include Angus, Simmental, and Limousin cattle. Breeding cattle from these two species has created several breeds of cattle, such as the Brahman and Brangus.

**Beef Breeds in Missouri**

Many breeds of beef cattle are found in Missouri. The major breeds of importance in the state are Angus, Red Angus, Beefmaster, Brahman, Brangus, Charolais, Chianina, Gelbvieh, Hereford, Limousin, Longhorn, Maine Anjou, Salers, Santa Gertrudis, Shorthorn, and Simmental.

Angus - Angus cattle were first imported from Scotland by George Grant of Kansas in 1873. The cattle are black and polled. The breed is known for its maternal ability and the production of high-quality carcasses with a large degree of marbling. Angus are the most numerous breed of cattle in the United States.

Red Angus - Some black Angus cattle carry a recessive gene for red coat color. Red Angus were developed by selecting the red individuals from Angus herds. They have the same characteristics as black Angus cattle.

Beefmaster - Tom Lasater is credited with the original development of this breed in Texas in 1931. The cattle are approximately a quarter Hereford, a quarter Shorthorn, and half Brahman. Color varies from red to almost white. Both horned and polled animals are registered. Beefmasters are selected for their good growth rate, hardiness, maternal ability, and fertility.

Brahman - American Brahman cattle were developed from Zebu cattle from India. Zebu cattle were brought to the United States in the late nineteenth and early twentieth century and crossed with several European breeds to create the American Brahman. Brahman cattle range in color from gray to black. Like *Bos indicus* breeds, they have loose hides, large ears, and a hump over their shoulders. Brahman cattle are horned. The resistance of this breed to heat has made it popular in the Southwest, where it was originally developed. They are also insect-resistant. Brahman cattle have been used to produce many new American breeds.

Brangus - Brangus cattle were developed in the early twentieth century by crossing Angus and Brahman cattle. They are five-eighths Angus and three-eighths Brahman. This breed is black and polled. Brangus are maternal, have a high growth rate, and yield thick carcasses with a minimum of excess fat.

Charolais - The King Ranch in Texas introduced the Charolais breed into the United States during the 1930s. The breed was originally developed in France. It was one of the first exotic breeds of cattle to be used in the United States. Charolais cattle are white in color and can be horned or polled. They are large, heavily muscled, and fast-growing, which makes them popular in crossbreeding programs.

Chianina - Chianina cattle originated in Italy and were first used in the United States in the early 1970s. They have been used to produce show steers and as a terminal breed. (With a terminal breed, producers sell all the offspring of the bull or cow as slaughter animals, with none being kept as replacements.) They can be almost any color. The cattle may be horned or polled. They are fast-growing and extremely large. Bulls may be up to six feet tall at the shoulder.

Gelbvieh - This breed originated in Germany and was imported in the early 1970s. Gelbvieh can be red to golden or black. They may be horned or polled. Gelbvieh are gentle and very maternal.

Hereford - Henry Clay of Kentucky first imported this breed of cattle from England in 1817. Herefords are red with a white face and chest. White is also found on the neck, feet, and switch (tail). They are

horned, but the Polled Hereford breed was developed from animals that were naturally polled because of a mutation. Herefords are excellent foragers and can tolerate cold weather, which makes them popular in the western United States.

Limousin - Limousin cattle originated in France and were first introduced into the United States during the late 1960s. They can be light red to dark red or black. Both horned and polled animals can be registered. The breed is noted mainly for their carcass traits. They are lean and heavily muscled.

Longhorn - Longhorn cattle were developed from cattle brought to North America from Spain. In the early 1500s, Spanish explorers brought Longhorns to Mexico and then to Texas, where they escaped and ran wild until being rounded up by cattlemen. Longhorn cattle are extremely hardy, which made them well suited to the long cattle drives of the nineteenth century. Longhorns were nearly extinct by 1900, but measures have been taken to save the breed. Animals can be almost any color or combination of colors. Their horns may spread to four or more feet. They are noted for their lean meat, adaptability to harsh environmental conditions, and resistance to many diseases and parasites.

Maine Anjou - Maine Anjou cattle originated in France in the 1840s from crosses between Shorthorn cattle and a French breed. The breed was introduced into the United States around 1970. The cattle can be red and white, solid red, black, or black and white. They may be horned or polled. Maine Anjou cattle are generally heavily muscled, gentle, and fast-growing. This breed has been used extensively in producing show steers.

Salers - Salers originated in France and were imported to the United States in the mid-1970s. Animals can be black or dark cherry red in color. They are a horned breed. Salers are known as an easy-calving, high-growth breed.

Santa Gertrudis - This breed was developed on the King Ranch in Texas in the early twentieth century. Santa Gertrudis cattle are five-eighths Shorthorn and three-eighths Brahman. They are dark red in color and can be horned or polled. The breed is known for easy calving and good foraging ability.

Shorthorn - Shorthorn cattle originated in England. The breed was first imported during the late 1700s and was one of the first breeds to be crossed with Longhorns. Shorthorns can be red, white, red and white, or roan in color. They may be horned or polled. Shorthorns are generally regarded as highly maternal, gentle cattle that produce high-quality carcasses.

Simmental - Simmental cattle are originally from Switzerland. They were first imported in 1969. Simmentals can be solid red, red and white, yellow, black, or black and white in color. Both horned and polled Simmentals are registered. Simmental cattle are large and fast-growing. They are known for being maternal and for high milk production.

**Selecting a Breed**

Of the breeds discussed, all have strong and weak points; no one breed is superior to another. Each producer must look at his or her needs, what breeds were used in the past, available feed and labor resources, the goals of the operation, market trends for a particular breed, and the traits of the breeds and then select the breed or breeds that would be best for him or her. Producers need to evaluate how to improve the profitability of their operations by increasing the value of the cattle that they sell. They need to follow current and future market trends and select breeds that best fit the markets. For example, breeds such as the Simmental and Gelbvieh may not be a wise choice for a producer with a limited amount of feed available because these larger, more maternal breeds have higher maintenance requirements and call for more feed resources.

**Summary**

Numerous breeds are used in beef cattle production in Missouri. Many breeds look similar physically but have different characteristics. Producers need to select breeds of cattle that fit the requirements of their operations and current and future market trends.

**Credits**

Baker, Meelee, and Robert E. Mikesell. *Animal Science Biology and Technology.* Danville, Ill.: Interstate Publishers, Inc., 1996.

Ensminger, M. E. *Stockman's Handbook Digest.* Danville, Ill.: Interstate Publishers, Inc., 1992.

Gillespie, James R. *Modern Livestock and Poultry Production.* 5th ed. Albany: Delmar, 1997.

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Thomas, Verl M. *Beef Cattle Production: An Integrated Approach.* Philadelphia: Lea and Febiger, 1963.

Proper selection of animals is extremely important in the beef cattle industry. Beef producers must decide which animals to select for different purposes, such as breeding and slaughter. High-quality animals are more productive and more valuable.

**Parts of a Beef Animal**

The use of correct terminology for the parts of an animal is critical to avoid confusion when describing it. Figure 3.1 shows the proper names for the parts of a beef animal.

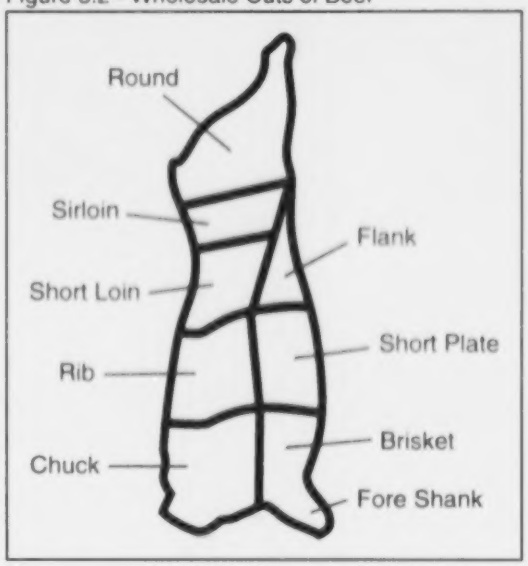
**Wholesale Cuts of a Beef Animal**

Wholesale cuts are large cuts of meat that retail stores (such as grocery stores) purchase and cut into smaller retail cuts. The consumer then buys the retail cuts. The wholesale cuts are the round, sirloin, short loin, rib, chuck, flank, short plate, brisket, and fore shank. Figure 3.2 illustrates the wholesale cuts.

**Selection of Slaughter and Feeder Cattle**

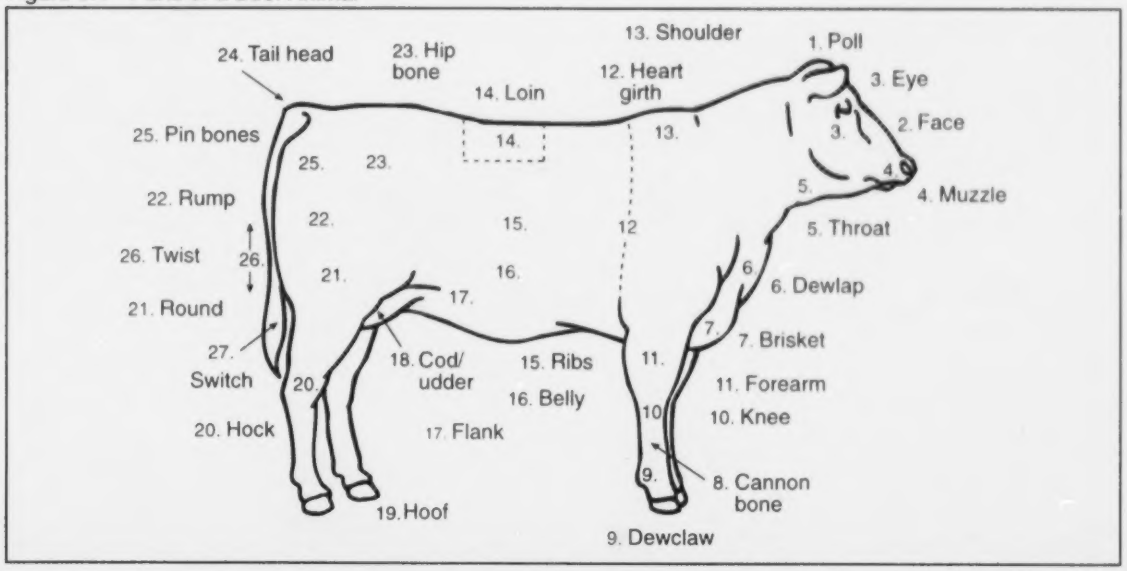
The selection of slaughter cattle is based on the future carcass quality and cutability (the percentage of salable meat from a carcass) of the animal. At slaughter, they are assigned different yield grades based on the quality of the carcass. The goal of producers is to choose slaughter cattle that will meet the standards for the choice quality grade. Choice grade beef is the most common grade purchased by the consumer. Slaughter steers and heifers should be evaluated for muscling, size, and amount of external fat.

Figure 3.2 - Wholesale Cuts of Beef




Muscling - Muscling translates into how much thickness the animal has. Thicker cattle have more muscle thickness and width along their top line and through their rump and stifle. Heavily muscled animals are wide when viewed from the rear. Muscular cattle produce carcasses with more salable meat, which is profitable for both the producer and packer. Areas to observe when

Figure 3.1 - Parts of a Beef Animal



evaluating muscling are the size of the forearm, thickness along the top of the animal, and thickness and depth of the quarter, as shown in Figure 3.3.

Size - The size, or weight, of the animal is another important factor in the selection of slaughter cattle. Size suggests the potential carcass weight of the animal. Packers prefer beef carcasses to weigh between 600 and 850 pounds. Larger or smaller carcasses are harder to process into suitably sized wholesale cuts. Beef cattle generally have dressing percents (dressing percent = carcass weight ÷ live weight) between 60 and 65 percent, with 62 percent being average. Live weights should be between 1,000 and 1,250 pounds.

External fat - External fat thickness is the final major component in selecting slaughter cattle. Slaughter cattle must have approximately half an inch or less of external fat on the twelfth and thirteenth ribs to have the potential to reach choice quality grade. Steers and heifers with half an inch of external fat will have a smooth appearance along their ribs and pones of fat (fat deposits) opposite their pin bones. The calves will also have evidence of fat on the cod or udder region and through the brisket.

Feeder cattle selection is very similar to the selection of slaughter cattle. As with slaughter cattle, the producer wants to select animals that will yield a choice quality grade carcass. Evaluation is based upon factors that will influence future carcass value. Feeder cattle are evaluated for frame size and degree of muscling, which indicate potential slaughter weights.

**Priorities in Slaughter Cattle**

Muscling - Heavily muscled forearm, top, and stifle

Live weight - 1,000 to 1,230 pounds

External fat - ½" or less at the twelfth and thirteenth ribs

Frame size - Frame size is determined by looking at height in relation to age. Feeder steers and heifers can have a large, medium, or small frame. The frame size of feeder animals is determined by predicting what the live weight of the calf will be when it has half an inch of external fat in the twelfth and thirteenth rib area.

Muscling - Muscling is the other factor in feeder calf selection. Feeder steers and heifers can have muscle scores of 1, 2, or 3, with the lower number assigned to the more muscular animal. Animals are given a muscle score depending on their thickness (see Figure 3.5).

Feeder cattle grades set a standard for comparing animals. The grade of a feeder steer is the frame size combined with the muscle score. A sample grade is "Medium Frame, No. 1," which refers to a medium-framed calf that is heavily muscled. This designation refers to a steer weighing between 1,000 and 1,200 pounds with half an inch of external fat and an ample amount of muscle thickness.

Figure 3.3 - Thickness

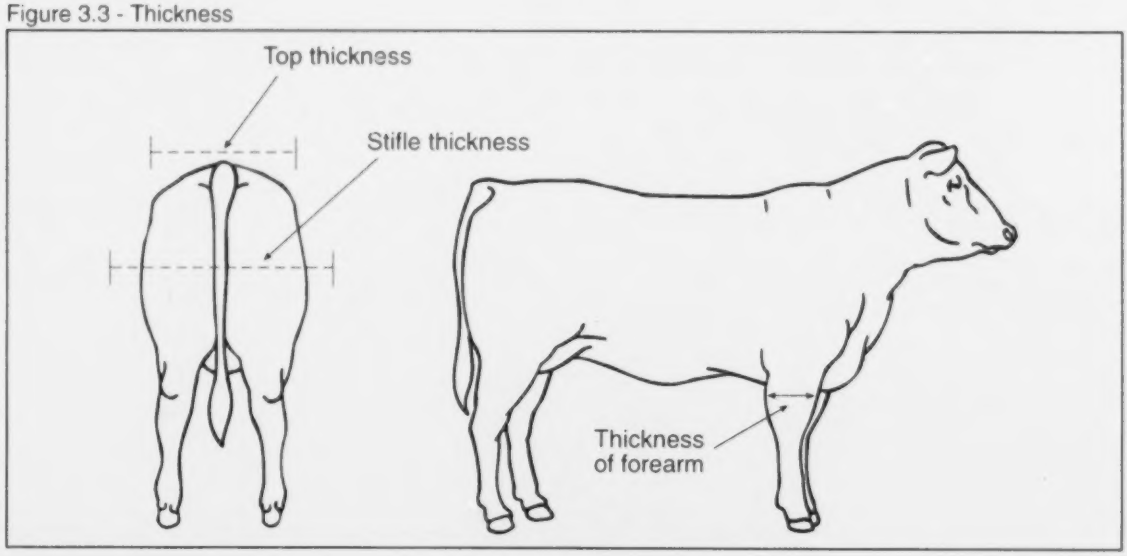
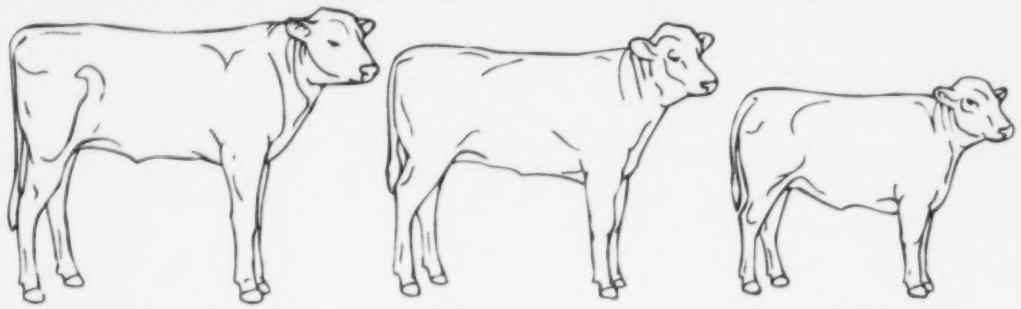


Figure 3.4 - Frame Size



**Large Frame**
- Tall and long for age
- At a half-inch of fat, steers will be 1200 lbs. or more heifers will be 1000 lbs. or more

**Medium Frame**
- Slightly tall and slightly long for age
- At a half-inch of fat, steers will be 1000-1200 lbs. heifers will be 850-1000 lbs.

**Small Frame**
- Small frame and shorter-bodied for age
- At a half-inch of fat, steers will be less than 1000 lbs. heifers will be less than 850 lbs.

**Breeding Cattle**

The selection of breeding cattle is partly based on visual characteristics like soundness, volume/capacity, muscling, and balance. Along with visual selection, producers often use performance values, frame score, and expected progeny differences (EPDs) to evaluate and select breeding animals. The selection of breeding cattle can have a lasting effect on a producer's cow herd. If the producer keeps the female offspring from a bull or cow, they will pass on its genetic material to other animals in the herd.

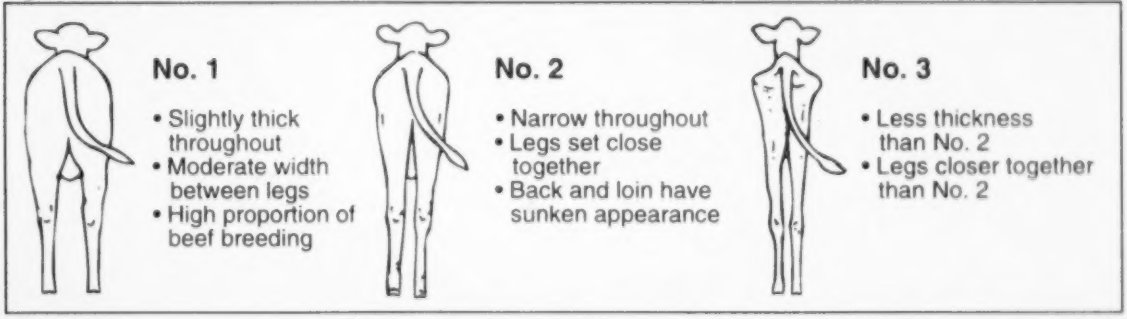
Soundness - Both skeletal and reproductive soundness are important in the selection of breeding cattle. Skeletal soundness refers to the animal's ease of movement. Beef cattle should take long strides off both ends of their skeleton and fill their track (the rear foot landing in the track left by the front foot) when moving. The animal should set its feet down square and wide. Reproductive soundness is extremely important in both males and females. Bulls need to have at least 32 centimeters of scrotal development at one year of age. Females need to show signs of development of the vulva and udder by breeding age.

Volume/capacity - Both males and females should be evaluated for body capacity. An animal should be deep sided (possessing vertical depth) and wide ribbed and have spring or curvature to the outside of its rib cage. Capacity determines how much forage and grains an animal can consume. The more it eats, the higher its production should be.

Muscling - Breeding animals should be heavily muscled to produce feeder and slaughter animals that are heavily muscled.

Balance - Balance refers to the skeletal and muscular formation of the animal. These factors

Figure 3.5 - Muscle Score



**No. 1**
- Slightly thick throughout
- Moderate width between legs
- High proportion of beef breeding

**No. 2**
- Narrow throughout
- Legs set close together
- Back and loin have sunken appearance

**No. 3**
- Less thickness than No. 2
- Legs closer together than No. 2

contribute to the beauty of its phenotype, or physical appearance. Beef cattle should be long bodied, level topped, uniform in depth, stout boned, and clean fronted (free of excess skin). Attractiveness is more important to purebred producers who show cattle for promotional purposes.

**Visual Selection Guide to Breeding Cattle**

1. Skeletally and reproductively sound
2. Adequate body capacity
3. Heavily muscled
4. Attractive

In addition to looking at these characteristics, producers may look at other measures to evaluate an animal for breeding. For example, performance data consists of information about how a particular animal has performed in the past. It includes actual weights, such as birth weight, weaning weight, and yearling weight. Feed to gain ratios are another important measure used in selection.

Frame score is a measure of height in relation to the age of the animal. The frame score can be used to estimate the size of the animal at maturity. Frame scores range from one to ten, with five to seven considered ideal. Bulls are generally larger than females at the same frame score.

The current trend in breeding animal selection is to use genetic estimates, or EPDs, as an aid for selection. EPDs make a prediction about the performance of the future offspring of a parent. They look at the difference in production between the offspring of a particular animal and those of an average animal. All EPDs assume that the parent has been mated to animals of equal genetic value. Negative numbers indicate lighter calves, while positive values identify heavier calves.

The basic EPDs a producer should be aware of are birth weight EPDs, weaning weight EPDs, yearling weight EPDs, and milk EPDs. Birth weight (BW) EPDs are a prediction in pounds of the difference in birth weights. Weaning weight (WW) EPDs are a prediction of the difference in pounds in weaning weight. Yearling weight (YW) EPDs are the difference in pounds at one year of age. A milk (M) EPD shows the difference in pounds in the weaning weights of the calves produced by the parent's female offspring due to the milk production of the cow.

Look at the sample EPDs in Figure 3.9. Evaluating the EPDs of the two bulls shows that if Bull #1 and Bull #2 are mated to genetically equal cows, calves from Bull #1 should be three pounds heavier at birth (2-(-1) = 3), fifteen pounds heavier at weaning (20-5 = 15), and twenty pounds heavier at one year of age (30-10 = 20). The calves from cows from Bull #1 should be five pounds heavier at weaning than those from Bull #2 because of the cows' milk.

Figure 3.9 - Sample EPDs

| | BW EPD | WW EPD | YW EPD | M EPD |
|---|---|---|---|---|
| Bull #1 | +2 | +20 | +30 | +5 |
| Bull #2 | -1 | +5 | +10 | 0 |

**Crossbred and Purebred Breeding Systems**

Crossbreeding is mating animals of different breeds. Commercial beef producers use crossbreeding to take advantage of the characteristics of different breeds. For example, a producer may want to cross an Angus, with its high carcass value, and a Charolais, since this breed has good growth and muscling. The offspring produced by crossbreeding display heterosis, or hybrid vigor. Heterosis results in improved performance, growth, and/or carcass traits. It is evident when the animal displays superior qualities in comparison to the average of its parents' traits. Producers using crossbreeding need to select bulls to use in their herds as well as replacement females. Most commercial producers buy purebred bulls and sell feeder calves or retain ownership through the feedlot. Daughters of bulls are usually kept as replacements.

Purebred breeders must select registered bulls and females of the same breed to purchase and use as replacements. They produce bulls and females used by other purebred breeders and commercial producers.

**Summary**

Knowing the names of the parts of the beef animal and the wholesale cuts of beef is necessary in the production of beef cattle. It is part of making informed choices in selecting animals. Slaughter and feeder cattle selection is based upon potential carcass traits. Breeding animal selection

encompasses visual traits as well as performance indicators and genetic estimates.

**Credits**

Boggs, Donald L., and Robert A. Merkel. *Live Animal Carcass Evaluation and Selection Manual.* 4th ed. Dubuque: Kendall/Hunt Publishing Company, 1993.

Gillespie, James R. *Modern Livestock and Poultry Production.* 5th ed. Albany: Delmar, 1997.

*Understanding and Using Sire Summaries (G2032).* University Extension agricultural publications, 1993.

Beef cattle operations have different requirements depending on the type of production that takes place. However, for any operation to be profitable, producers require good handling facilities, proper forage management, and knowledge of production costs and marketing options.

**Facilities**

Well-planned, usable facilities are essential, whether an individual is a purebred breeder, cow/calf producer, backgrounder, or feedlot operator. Facilities should be well planned and adapted to the needs of the individual producer. The basic handling facility for all operations, diagramed in Figure 4.1, includes a holding pen with a narrow chute or alley that funnels cattle into a headgate, which is used to restrain cattle. Figure 4.2 shows a headgate. These facilities are important for herd health care, since they are used when giving vaccinations and medications. Most producers also include loading and unloading areas, which are usually incorporated into the handling facility. The goals behind the design of handling facilities include safety for the producer and the cattle, moving cattle through the facility with minimal labor, and convenience and accessibility.

Modifications or additions can be made to facilities based on factors such as the number of cattle owned, amount of capital, and current facilities. Larger cattle operations require more elaborate facilities to accommodate the number of animals present. For example, large farms and ranches may have handling facilities, buildings for feed storage, feed mills (for processing and preparing feed rations), and a maternity barn where pregnant cows are housed when they are close to giving birth. Handling equipment and facilities can be expensive,

Figure 4.1 - Simple Handling Facility

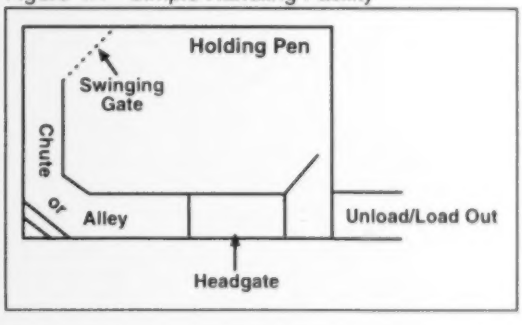
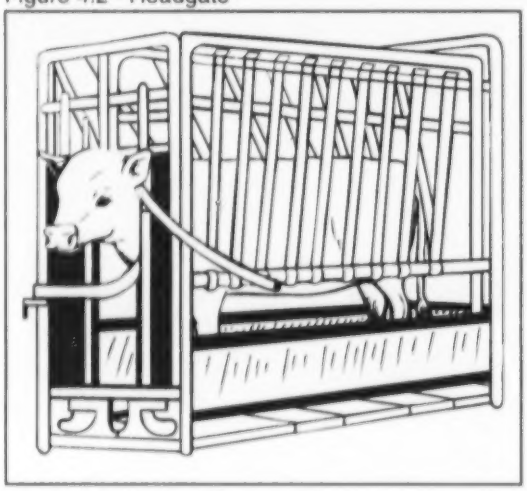



Figure 4.2 - Headgate



however, which affects whether a producer can add new facilities to his or her operation.

Cow/calf producers and purebred breeders require the same basic facilities. They include handling facilities, loading and unloading areas, and feed and hay storage. However, larger operations, particularly those owned by purebred breeders, may add a show/sale barn, a maternity barn, more elaborate handling or working facilities, and an office.

Backgrounders have the fewest requirements as to facilities. They usually raise their calves on grass pasture. However, backgrounders still require handling facilities and a loading and unloading area.

Feedlots require handling facilities, a loading and unloading area, feed storage, and a feed mill. Cattle are grouped together in feeding lots and fed until they reach market weight. Large feedlots have tremendous amounts of money invested in facilities, which must be in place before the cattle can be fed.

**Forages**

As mentioned in Lesson 1, a major advantage of producing beef cattle is that they can use forages for food. Beef cattle can eat forages because they are ruminants. Ruminants have a four-part stomach that allows them to digest plant material efficiently.

Forages in some form or another are used in all types of beef cattle production.

Cow/calf producers and purebred producers use forages to feed the herd year-round. Depending on the weather conditions and location, cattle may graze on grass pastures from May through November. Producers can use grass resources more efficiently by setting up a rotational grazing system. Rotational grazing involves dividing pastures into small units; the cattle alternate between them when grazing. This type of grazing allows the producer to increase the number of animals per acre because they consume most of the available forage. During the summer, the producer harvests excess forages as hay or haylage, which will be used during the winter. In an ideal situation, the cattle require little or no supplemental grain. Cow/calf producers may also feed their cattle on cornstalks or wheat pasture during the winter.

Backgrounders use forages as an inexpensive way to achieve gain in purchased feeder steers. They put steers and heifers on grass pastures or fed hay until they are large enough to go to the feedlot. Backgrounders, like cow/calf producers, may feed cattle on cornstalks or wheat pasture throughout the winter.

Depending on their location, feedlot operators may or may not use forages as the basis of cattle diets. Most feedlots feed cattle grass hay for a few days after they are received. Some feedlots feed a base diet of haylage, but most use a diet of corn silage and grain with protein supplements.

**Production Costs**

Beef cattle production should be viewed as a business; the goal of any business is to make a profit. One major factor to consider when running any business is return on investment. Costs for beef production vary widely depending on the size of the operation, facilities, labor requirements, loans, and other factors. Fixed costs will be similar for all producers despite the type of production system used. Fixed costs include depreciation, interest on loans, repairs, taxes, and insurance. The types of variable costs a producer has may differ depending on the production system. The major variable cost in livestock production is the cost of feed. Other variable costs include medications, veterinary expenses, equipment, facilities, and the cost of the stock.

Producers have to consider several factors when calculating the costs of production and returns on investment. Suppose a producer wants to buy a few feeder steers. The producer has pasture available but is also going to feed the steers five pounds of grain per head per day. The grain mix is $12 per 100 pounds. The producer can buy 400-pound steers at $62.00 per 100 pounds (or $.62 per pound). Market trends predict 500-pound steers will be worth $64.00 per 100 pounds (or $.64 per pound) in 90 days. Can the producer profit from buying the steers?

The initial cost of one steer is $248 (400 pounds × $.62). The feed costs are $54 for that animal (5 pounds × $.12 × 90 days), which gives a total cost of $302 ($248 + $54). The producer will sell the steer for $320 (500 pounds × $.64/pound). Each steer will therefore yield a profit of $18, excluding any death losses or veterinary expenses.

The producer should also calculate the break-even price. It is the price required to cover costs. The formula for break-even price is given below.

$$\text{Break-even price} = \frac{\text{Total costs}}{\text{Total pounds of calves sold}} \times 100 \text{ lbs.}$$

The producer in the above example must receive $60.40 per cwt (100 pounds), or $.604 per pound, to cover costs.

**Choosing a Production System**

Many factors must be considered when choosing a production system. The major differences between the systems involve the amount of labor, capital, and time committed and the management skills required. Not all producers have the resources or ability to operate a 100,000 head feedlot.

Inexperienced producers with limited resources would be better suited to backgrounding feeder calves or possibly starting a small cow/calf operation. These businesses do not require as large an investment as the others. Labor

requirements are also much lower than the other production systems.

Producers with more experience may choose to run large cow-calf or small purebred operations. These types of production require more money, time, and labor.

Skilled producers with solid financial backing may choose to own a feedlot operation or a purebred herd. These operations require the most resources in terms of money, labor, and time. Producers interested in raising purebred livestock must realize that promotion and marketing skills are extremely important to be successful.

**Marketing Options**

Beef producers have a variety of marketing options available to them. Among them are auctions (including video auctions, in which buyers view a video recording of the cattle being sold that is transmitted via satellite), sales to livestock order buyers, private treaty sales, consignment sales, production sales, direct sales to the packer, and trading in cattle futures. Different marketing options may be used depending on the type of production system.

Cow/calf producers can use several marketing techniques. They generally sell feeder calves to the highest bidder through a local or video auction, but some producers retain ownership of the calves through the feedlot. They make payments to the feedlot operator that cover the feed costs and a daily cost per head to feed and care for the cattle. When the cattle are sold to a packer, the producer receives the revenue. Cow/calf producers sometimes sell their cattle off the farm directly to livestock order buyers who buy cattle for feedlot operators and packing plants. Recently, many producers have formed alliances or marketing groups to market like sets of calves that are the same in size or breed as a branded or labeled product (e.g., Certified Angus Beef).

Cow/calf producers also have the option of using the cattle futures market. In this market, futures contracts are bought and sold. Futures contracts call for the delivery of cattle at some future date. They can help manage the financial risk of beef cattle production if a producer uses them to hedge on cattle prices. Hedging involves buying or selling a futures contract to prevent losses from rising or falling prices.

Purebred breeders, backgrounders, and feedlot operators can also use the cattle futures market, as well as several other marketing options. Purebred breeders may sell their cattle at auctions or private treaty sales, which are sales in which a producer and customer privately negotiate the terms of the sale. They may also sell animals at a consignment sale, a special type of auction in which producers entrust a group of animals to another party, such as a breed association, to be sold for a commission. A fourth marketing option used by purebred breeders is a production sale. This type of sale is an auction by one producer or a small group of producers that takes place on a farm. Backgrounders have fewer options for marketing their animals. They often sell cattle at live or video auctions. Feedlots that own cattle may either auction them off or sell them directly to the packer, with the amount of money received determined by the live weight or carcass grade of the cattle.

**Summary**

Producers of beef cattle need to consider many factors when evaluating a production system. Well-planned facilities are essential for successful beef cattle production, and all production systems require basic handling facilities. Feeding cattle appropriately on forages is also very important, since forages are often a primary source of nutrients. Production costs vary greatly according to the production system used, and producers can market their beef cattle in many different ways. Producers must evaluate their talents and resources when selecting a production system.

**Credits**

Baker, Meelee, and Robert E. Mikesell. *Animal Science Biology and Technology.* Danville, Ill.: Interstate Publishers, Inc., 1996.

Gillespie, James R. *Modern Livestock and Poultry Production.* 5th ed. Albany: Delmar, 1997.

Lee, Jasper S., et al. *Introduction to Livestock and Poultry Production.* Danville, Ill.: Interstate Publishers, Inc., 1996.

Taylor, Robert E., and Ralph Bogart. *Scientific Farm Animal Production.* 3rd ed. New York: Macmillan Publishing, 1988.

Thomas, Verl M. *Beef Cattle Production: An Integrated Approach.* Philadelphia: Lea and Febiger, 1963.

Preserving herd health is essential to success in beef cattle production. A knowledge of health problems that affect beef cattle is vital. Developing a herd health program and knowing the proper routes of administration for giving vaccinations and medicines are an important part of maintaining herd health. A producer should work closely with a veterinarian to help keep his or her cattle healthy.

**Herd Health Problems of Beef Cattle**

Many diseases can affect beef cattle. A few of the major disorders are listed below. Producers should be familiar with their symptoms to be able to identify herd health problems.

Anaplasmosis - This disease is caused by parasites spread by biting insects. It results in the destruction of oxygen-carrying red blood cells. Symptoms include weight loss and labored breathing. Affected animals may die of a lack of oxygen. Controlling insects and giving vaccinations can help to prevent anaplasmosis. It is treated with daily doses of antibiotics.

Blackleg - Blackleg is one disease caused by the clostridial microorganism. This disease usually results in the death of fast-growing calves. Symptoms include swollen and inflamed muscles and lameness. Gas from swollen muscles builds up under the skin and makes a crackling noise when pressed. Vaccines are inexpensive and very effective.

Bovine respiratory syncytial virus (BRSV) - This virus weakens the respiratory system, making the animal more vulnerable to infection. Symptoms include discharge from the mouth and nose, fever, and a hacking cough. Calves are more likely to become ill, especially ones that are under stress. Producers can vaccinate animals against this disease.

Bovine virus diarrhea (BVD) - BVD can cause severe diarrhea in cattle. Other symptoms that may be present include fever, coughing, and nasal discharge. It can be prevented through vaccinations.

Brucellosis - Brucellosis is an incurable reproductive disease causing abortions. Cows and bulls may also become sterile. Because the disease has no cure, infected animals must be slaughtered to keep it from spreading. Producers should vaccinate replacement heifers as calves. The microorganism that causes the disease can also infect human beings.

Fescue foot - Fescue foot is a nutritional health problem that occurs in cattle pastured on tall fescue due to a toxin in the fescue. In severe cases, the animal may lose one or both of the rear hooves, as well as the tips of the ears and tail. Other symptoms include an arched back, rough coat, and stiffness or lameness. One way to prevent fescue foot is mixing legumes with the fescue.

Grass tetany - This nutritional disorder is found in cattle grazed on grass pastures that have insufficient levels of magnesium. It usually occurs in lactating cows but may develop in other cattle. Some symptoms are trembling and staggering. If untreated, it may cause death. Prevention involves feeding cattle magnesium supplements. The disorder is treated with intravenous administration of a solution containing magnesium and calcium.

Infectious bovine rhinotracheitis (IBR, red nose) - IBR is caused by a virus and takes several forms. One form is a respiratory disease characterized by fever, nasal discharge, and a reddened muzzle. In females, another form attacks the reproductive system and causes inflammation of the vagina and vulva and also abortions. A third type is similar to pinkeye. Cattle should be vaccinated for IBR.

Leptospirosis - Leptospirosis is spread through the urine of infected animals. Symptoms of this disease include fever, rapid respiration, poor appetite, and jaundice. It causes abortions, weak calves, and stillbirths. Five different strains of leptospirosis exist, so producers should consult their veterinarian to learn which vaccine is appropriate. Humans can get the disease from cattle.

Pinkeye - This disease causes the eye to develop a pinkish color or, in the more serious form of the disease, to water and develop a white, cloudy film. Blindness may occur. Vaccinations can be used to help control pinkeye. Proper fly control also seems to help limit outbreaks of the disease.

Scours - Scours is a complex condition that can have many causes, including BVD. It causes severe diarrhea in calves and can cause death. Producers can vaccinate cattle before calving as an aid in prevention, although good sanitation is also important in controlling this disease.

Shipping fever (parainfluenza, pasteurella, hemophilus pneumonia) - Shipping fever is a term commonly used to refer to several respiratory diseases. High fever, coughing, difficulty in breathing, and discharge from the eyes and nose are symptoms. This disease often appears in cattle that are under stress. It can be prevented with vaccinations.

Vibriosis - Vibriosis is a disease spread among females by the bull during breeding. It results in abortions with no outward signs of disease. It also causes poor conception rates. Vaccines are available to prevent the disease.

**Herd Health Programs**

Developing a herd health plan is very important for all beef cattle producers. The herd health program used by a producer affects the wholesomeness and profitability of the final beef product. Producers should always keep in mind that they are producing beef, not just cattle.

Herd health programs should focus on disease and parasite prevention rather than treatment, since prevention is far more economical and successful than treatment programs. Cow/calf producers and purebred breeders should vaccinate feeder calves against IBR, PI3, BVD, BRSV, pasteurella, and clostridial diseases like blackleg before weaning. Producers should consult their local veterinarian and/or animal health supplier for the exact timing of all vaccinations. Many vaccines require a booster shot, which is a second round of injections given shortly after the original vaccination. Vaccines can often be purchased in combination with one another. The producer should also apply products that kill external and internal parasites. Injections, pour-on insecticides, and oral medications can control parasites.

Cow/calf producers and purebred breeders should vaccinate replacement bulls and heifers against BVD, IBR, PI3, leptospirosis, vibriosis, hemophilus pneumonia, pasteurella, and clostridial diseases. Replacement heifers also need to be vaccinated against brucellosis at four to nine months of age by giving them the OCV vaccine. Vaccinations are usually done thirty days before breeding to build immunity before breeding occurs. These vaccines may require that a booster shot be given. If parasites have not already been treated, the producer should apply products that kill external and internal parasites when giving the booster shots. At the same time, mature cows and bulls should also be given boosters for leptospirosis, vibriosis, BVD, IBR, and clostridial diseases, along with external and internal parasite treatments.

Backgrounders and feedlot operators will usually revaccinate cattle because the history of the calves is unknown. They vaccinate their cattle against IBR, PI3, BVD, BRSV, pasteurella, and clostridial diseases and treat animals for external and internal parasites. Work is currently being done on providing vaccination information on a certificate or special tag along with the cattle to save on the cost of boosters.

**Routes of Administration**

Producers can administer animal health products in a variety of ways. The label should always be consulted before giving any vaccines, dewormers, or other medicines to check on the proper routes of administration, expiration date, and use of the product. Common routes of administration are intramuscular, subcutaneous, oral, intranasal, and intravenous. They are pictured in Figure 5.1.

Intramuscular (IM) - Intramuscular injections are made into the muscle. They should be given in the neck, never along the back or hip of the animal. Intramuscular injections are used for antibiotics and some vaccines.

Subcutaneous (Sub-Q) - Subcutaneous injections are given between the skin and muscle. They should be given in the loose skin on the side of the neck. This route is recommended because of the potential for carcass damage when injections are given into muscle tissue.

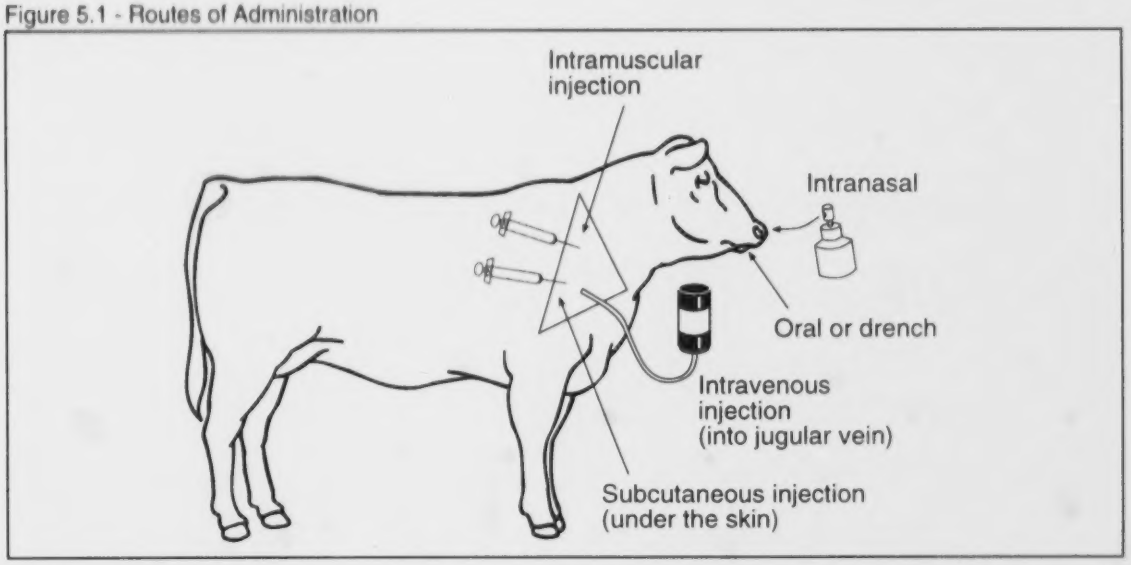
Oral - An oral, or drench, is administered through the animal's mouth. Dewormers and some vaccines are given orally.

Intranasal (IN) - Like nasal sprays used by humans, intranasal vaccines are sprayed into the nasal cavity.

Intravenous (IV) - Intravenous treatments are given directly into the jugular vein of the animal. Either injections or actual drip IVs can be administered in this way.

Subcutaneous injections should be used whenever possible, but the directions must be read and followed exactly! The producer should also be aware of withdrawal dates, which indicate the

Figure 5.1 - Routes of Administration




number of days after the injection is given that he or she must wait before selling the animal for slaughter.

**Summary**

Every cattle operation should develop a thorough herd health program. The veterinarian and producer both need to be involved in herd health management. Most cattle diseases can be prevented with proper management. Vaccinations should be given on schedule to help ensure herd health. Producers should follow the directions on the label exactly when vaccinating cattle. If an injectable vaccine is used, subcutaneous injections should be given if possible.

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Good herd management practices are vital for profitable beef production. Supplying an appropriate diet and applying reproductive management practices lead to maximum production and reproductive efficiency. Another important aspect of herd management is using a method to identify livestock for record keeping purposes.

**Nutrition**

Proper nutrition is essential for maximum growth and performance in any animal. It is also a key to herd health. Beef cattle require balanced diets containing the appropriate levels of energy (supplied by fats and carbohydrates), protein, vitamins, minerals, and water. With proper levels of these nutrients, the animals can carry out the bodily processes necessary for maintenance and production.

Maintenance involves replacing cells, repairing damaged cells, and fighting off diseases. Animals fed balanced diets receive essential vitamins and minerals, which aid the body in fighting diseases. Without proper nutrition, an animal's ability to ward off disease is reduced, which usually results in sickness.

The nutritional needs of animals change as they pass through different stages of production. For example, their nutritional requirements increase as they experience growth and development. Gestation (pregnancy) and lactation (milk production) also increase their nutrient needs.

**Reproductive Management**

A second part of herd management is correctly managing breeding and reproduction. Whether producers choose spring calving (February to May) or fall calving (September to November), the length of the calving season needs to be limited to 60 days to ensure the uniformity of calves at weaning. Producers must plan the turn out and lock up dates for bulls to control the length of calving. Bulls should be turned out with the cows between 60 and 90 days after the first calf is born and locked up 90 days later to maintain the current calving cycle. Bulls should not be turned out before 60 days have passed because many cows are not ready to conceive again until 60 to 90 days after calving.

Producers should evaluate all bulls for breeding soundness before they are turned out with the cows. Qualified veterinarians examine semen under a microscope to check for abnormalities, sperm count, and motility (ability to move). Producers should replace bulls that fail the breeding soundness exams to help ensure that the cows will be bred. Generally, young bulls can breed between 15 and 20 cows annually, while mature bulls can handle up to 50 cows.

Heat detection is critical for producers who use artificial insemination (AI) in their herds. One of the most obvious signs of heat is that females will allow others to ride or mount them. When a female is in heat, the producer can artificially inseminate the female and return her to the herd. Some producers will try to manipulate the estrus cycle by giving hormone injections to cows in a process called estrous synchronization; many cows can then be made to cycle simultaneously. This practice allows the producer to utilize the labor required for artificial insemination better.

Pregnancy checking is another important management practice that can increase reproductive efficiency. In this process, the female's reproductive tract is palpated to check for evidence of fetal growth and development. Producers should check all breeding females exposed to the bull 60 days after the bull is locked up; before 60 days have passed, pregnancy is more difficult to detect. All females that are checked and are open (not bred) should be sold. The other females will have an average gestation length of 281 days. A table showing the expected birth date for various service dates is provided in Table 6.1.

**Identification**

Methods of identifying cattle for record keeping purposes include ear tags, tattoos, and brands. Plastic tags that hang in the animal's ear are the most common method of identification. Clamps hold them in the ear, much like an earring worn by humans. Cattle tags come in a range of sizes and colors with a cost of $.50 to $1.00 each. The tags can be purchased blank or preprinted with numbers. Some type of tag applicator must also be purchased to apply the tags. Ear tags should be readable. They are not permanent and can be removed if necessary.

A second way to identify cattle is by tattooing. Producers of purebred cattle generally tattoo numbers and a herd prefix (a letter code for an individual farm) inside the ear of the calf. Then they rub ink over the tattoo. To read the number, the calf

Table 6.1 - Gestation Table

| DATE OF SERVICE | Due Date | DATE OF SERVICE | Due Date |
|---|---|---|---|
| January 1 | October 10 | July 1 | April 9 |
| January 15 | October 24 | July 15 | April 23 |
| February 1 | November 10 | August 1 | May 9 |
| February 15 | November 24 | August 15 | May 24 |
| March 1 | December 8 | September 1 | June 10 |
| March 15 | December 22 | September 15 | June 24 |
| April 1 | January 8 | October 1 | July 10 |
| April 15 | January 22 | October 15 | July 24 |
| May 1 | February 7 | November 1 | August 10 |
| May 15 | February 21 | November 15 | August 24 |
| June 1 | March 8 | December 1 | September 9 |
| June 15 | March 24 | December 15 | September 23 |

*Adapted from the *Missouri Agricultural Record Book for Secondary Students*

must be restrained in a head gate. Tattooing is a permanent form of identification.

Another permanent form of identification is branding. Producers can use either fire branding or freeze branding. Fire branding involves placing a metal branding iron in a fire until it is red hot and then branding the animal. The brand burns away the hair in the shape of a number or symbol. Fire brands lower the value of the animal's hide. Freeze branding, in contrast, does not affect hide value. It involves placing the branding iron in a solution of liquid nitrogen or dry ice and alcohol. The hair is then shaved from the area where the brand is to be placed, and the animal is branded. The cold brand removes the pigment from the skin, and white hair grows back in that area. Freeze brands work especially well with black calves. They are more humane than fire brands. All farm insignia brands should be registered with the Missouri Department of Agriculture.

**Summary**

Managing a beef herd involves monitoring several factors. Cattle diets, for example, must consist of the proper levels of nutrients to ensure health and production. Producers must also manage reproduction closely to help ensure that females will be bred. Finally, they should properly identify cattle with either an ear tag, tattoo, or brand to aid in identification and record keeping.

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Consumers of beef products and beef producers share an interest in the future of cattle production. Consumers are often concerned about how cattle are raised and how cattle production methods will affect the beef they consume. Producers are working to correct misconceptions about the beef industry by educating the public.

**Consumer Concerns**

Over the last several years, American consumers have become increasingly concerned with food safety, environmental awareness, the ethics of beef cattle production, and animal rights.

Lack of food safety is one of the American consumer's greatest fears. Currently, most of the concerns revolve around bacterial and chemical contamination of the food supply. Highly publicized incidences of food safety and food preparation shortcomings have caused anxiety about the safety of beef. For example, cases in which people have become ill and even died because of *E. coli* bacteria in undercooked hamburger have increased fears among consumers. Consumers are also uneasy about the possible contamination of meat by residues from antibiotics and growth hormones given to beef cattle.

A growing concern of the American public is the impact of beef cattle production on the environment. Over the last 30 years, preservation of the environment has become an increasingly important issue in the United States. Consumers are especially concerned with waste management and the potential for contamination of water from the runoff of cattle waste into rivers, lakes, and streams. Many people are also concerned about the overgrazing of public lands in the western United States.

The ethics of livestock producers are also coming under attack by consumers. Unethical practices, especially those involving showring activities, have been brought to the attention of the American public. One problem is the ownership of animals by adults who allow young people to show them. Many people view this practice as unfair to junior producers who have to purchase or raise their animals themselves. The illegal use of steroids to enhance performance is a second issue of concern to consumers.

Another area of interest to the American public is the ongoing debate over animal rights. Some groups, such as People for the Ethical Treatment of Animals (PETA), believe that all animals have the same rights as human beings. They feel that humans do not have the right to use animals as resources. These groups oppose agricultural practices that they believe limit an animal's right to live freely. Activists have carried out many protests, mailings, and demonstrations against animal agriculture. Large livestock shows and fairs are favorite sites of demonstrations by animal rights activists.

**Animal Rights and Animal Welfare**

As described in the preceding paragraph, animal rights activists believe that animals, like human beings, have rights, and they should therefore not be used for food or research. Activists view castration, dehorning, and vaccination as inhumane. These practices are objectionable because they alter the animal from its original state and because many are done without anesthetics.

Because of the controversy over animal rights, the term animal welfare causes many producers to become uneasy and upset. However, a clear distinction between animal rights and animal welfare should be made. Animal welfare involves a concern for the well-being of animals used by humans. People with an interest in animal welfare believe that animals should have all their needs met in a comfortable environment. The producer is responsible for providing the necessary food and shelter.

Most, if not all, producers are in fact concerned with animal welfare. The welfare of animals affects their growth and production, which ultimately affects the profits received by the producers. The key to addressing this issue is to continue educating both consumers and producers so no grounds exist for making allegations of abuse and mistreatment of animals in agriculture.

**Addressing Consumer Concerns**

The beef producer might ask, "Why should I be concerned with what the American public thinks?" The obvious answer is that the public consists of the customers for agricultural products. The old saying that the customer is always right still applies.

In response to public concerns, local, state, and national cattlemen's associations have developed voluntary programs that focus on correcting

practices that might trouble consumers. One such program, sponsored by the Missouri Cattlemen's Association, is the Beef Quality Assurance Program. The goal of the program is to make producers aware of issues that affect the safety and wholesomeness of beef. The Beef Quality Assurance Program aims at educating producers about proper management practices, proper record keeping for drug usage, and details about various growth hormones and vaccines used in beef cattle production. Producers are also informed about the correct usage, dosage, and withdrawal times for hormones and vaccines.

In addition, the USDA is implementing a new inspection program aimed at reducing bacterial contamination to address concerns about food safety. Rather than using a visual inspection, inspectors will look at bacteria counts by taking swabs of the surface of the carcass and growing bacterial cultures.

Industry associations also seek to emphasize to consumers the safety of beef production for the environment and encourage environmental awareness among producers. The National Cattlemen's Beef Association presents several Environmental Stewardship Awards annually to producers who use innovative methods to protect natural resources. In addition, the Association's publications for consumers emphasize that beef production is environmentally friendly. They point out, for example, that production primarily takes place outside in unconfined settings. This practice spreads the cattle waste over the ground where it is recycled as fertilizer.

A major focus of many 4-H and FFA leaders has been to educate young people and their parents on the damaging impact of unethical showring practices. The emphasis has been on zero tolerance. The Missouri State Fair has adopted the National Code of Show Ring Ethics formulated by the International Association of Fairs and Expositions. Exhibitors must sign a form that guarantees that they will not violate the code, which includes provisions about ownership and drug use in animals. If they do, they forfeit any prizes won and may be barred from exhibiting their animals.

Industry associations have emphasized the importance of animal welfare to both producers and consumers. The Beef Quality Assurance Program gives guidelines on how to handle and care for animals. The Missouri Beef Quality Assurance Program manual includes a Code of Ethics that stresses the humane treatment of cattle. Producers have relied on these industry associations to get the word out to consumers that beef producers care for the welfare of their animals. Many consumers are unaware of the radical ideas of many animal rights supporters. They often withdraw support from such groups once they understand them.

**Summary**

Consumers are becoming increasingly concerned with food safety, environmental safety, producer ethics, and animal welfare. Recent concerns are being addressed by educating producers and consumers. Producers are actively working to provide a positive image of beef and beef production.

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